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Terra Dispositions

Alec Rovensky

SYR ARCH
THESIS
2021

ter•ra

1. land or territory
2. the planet earth
3. baked clay; a hard pottery

dis•po•si•tion

1. temperamental makeup
2. a physical property or tendency
3. arrangement, positioning or distribution

Alec Rovensky
Syracuse University School of Architecture Senior Thesis, Spring 2021
Renée Crown University Honors Program Capstone, Spring 2021

Advisory Group: *Dissimulating & Disheveling Matter*
Advisors: Jean-Francois Bedard, Britt Eversole, Roger Hubeli, Julie Larsen
Honors Capstone Reader: Errol Willett

With assistance from: Noah Fritsch & Daniel Horan

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Contents

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REGISTRATION

reg•is•tra•tion

1. to convey an impression of
2. a written record containing regular entries of items or details
3. a condition of correct alignment or proper relative position

Terra Dispositions

Human intervention of the landscape by damming, filling wetlands and over-extracting is resulting in the rapid perversion of water bodies through the desertification or flooding of terrain and the ensuing contamination of reservoirs. In turn, these changes are disrupting ecosystems, reshaping geological borders, and causing irreversible damage that poses a threat to clean water supplies. As humans exert agency over local hydrology, there is scarce consideration of the ensuing ecological consequences.

This thesis aims to expose the ecological transformations of territories laced with human agency by examining the residues left by water in order to deviate from the misplaced nostalgia of a return to nature in favor of a critical awareness. Clay, a residue historically significant for its elasticity and widespread availability, becomes a registration of these transformations. Through the integration of traditional slip-casting and contemporary digital fabrication methods, the thesis attempts to reveal these changes through the form-making of a temporal ecological monument.

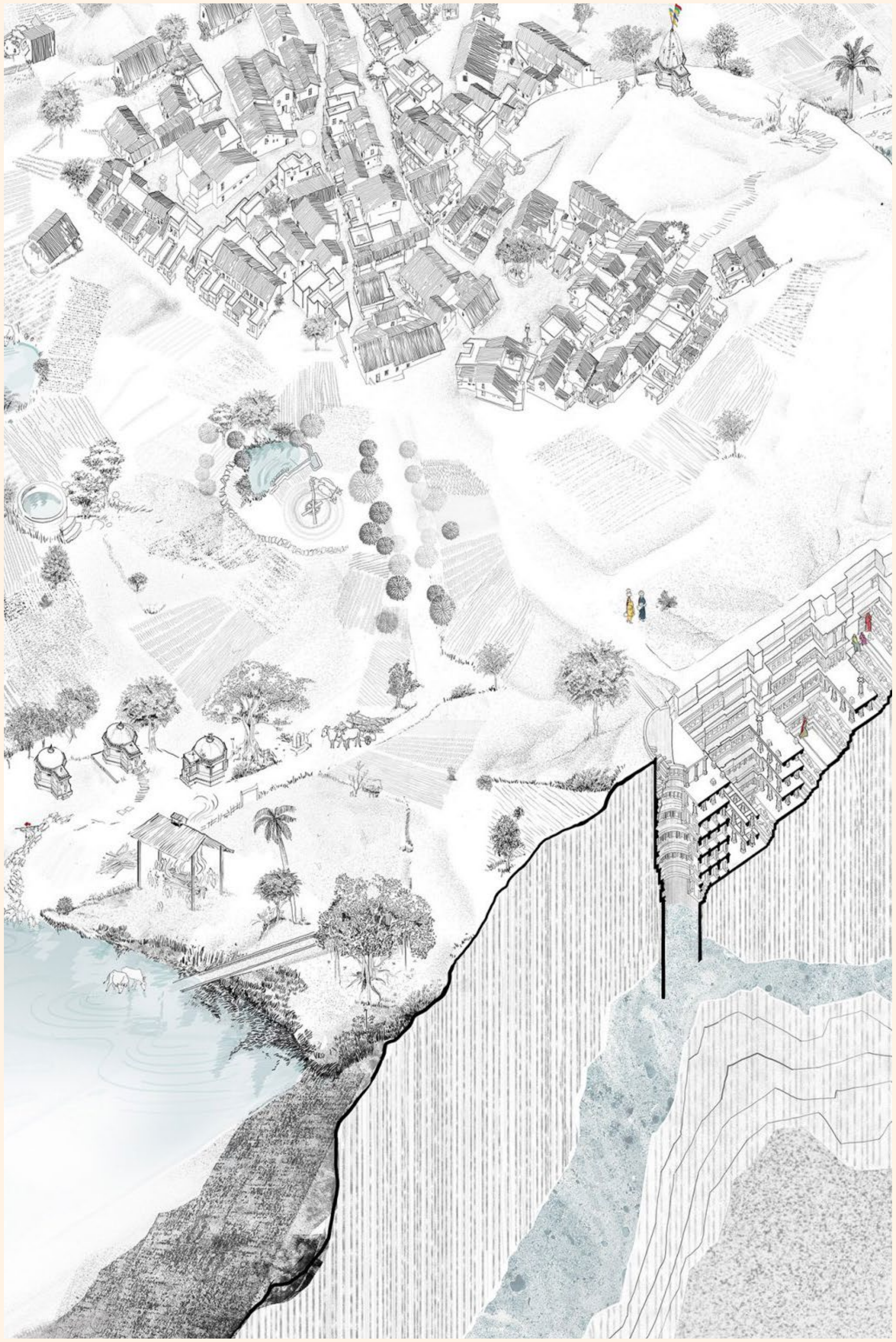
Introduction

Humanity has been intervening in the Earth's landscape for millennia. Much of these interventions have centered around water, arguably the most important resource to sustain civilization, humans have increasingly built complex infrastructures to control and manipulate it. This act of exerting influence and intent over a resource such as water is called agency, and generally refers to the human capacity to bring about a particular outcome. Urbanism, or the development and planning of cities and towns, is increasingly favoring "dryness" by paving over wetlands, damming, building over river flows, and coastal expansion. In turn, these massive interventions are disrupting the underlying hydrology and the overall local ecosystem. Yet because many of these initial transformations occur beneath the ground, and over long stretches of time, there remains a general unawareness of the ecological consequences of these constant interventions. Increasingly however, these changes are being made known through the increase of devastating weather and geological events. Droughts, wildfires, flooding and deforestation are growing evidence of these ecological changes.

As increased attention is given to the changing ecology, humans are quick to call for a "reversion" to a pre-human natural world. A certain idealism is placed in the pre-industrial condition, that celebrates an "untouched" natural environment. This thesis argues that this longing is instead embedded within a misplaced nostalgia, a longing for a false reality that never existed. In fact, the "man-made" versus "natural" dichotomy is a false one altogether, as both are synchronous and interconnected. The thesis further suggests that no part of the world is now left untouched by human agency, as even areas that remain unaltered by humans, have been selected to be left alone. Additionally, the reversionist attitude towards ecology repeatedly ignores new, evolving ecologies that materialize from human interventions. The Los Angeles River, for example, is now a concrete corridor for most of its length, with many calling for its "restoration." However, the river originally had seasonal fluctuations that would disrupt its flow until large parts of the river were paved with concrete, altering its hydrology. It can be argued then, that this is the most river-like it has ever been, continuously flowing all year. Calls for a reversal to its pre-altered state also fail to consider the fauna and organisms that have come to thrive in this altered river. Its reversal to a pre-industrialized state would devastate the thriving ecology that has adapted to these new circumstances. This misplaced nostalgia is distracting from more productive actions that critically consider the current state of our ecology.

One way to track these changes is to index the various residues that are left behind by the different phenomena that act upon the landscape. Clay is one such residue, historically significant for its widespread availability and functional flexibility. Clay has been used to store, move and control water on smaller scales as well, and has unique properties that are altered at various stages of its use. When clay is derived from the earth, it resists water and is highly flexible. Once it dries, the clay becomes extremely brittle and structurally weak. When it is fired inside of a kiln, the clay undergoes chemical changes that turn into a significantly stronger material. This thesis is utilizing an industrialized version of ceramic production called slip-casting which involves the making of plaster molds to mass-produce ceramic objects. Slip consists of clay particles suspended in water, using an added deflocculant that reverses the polarity of clay particles to keep them from flocculating (clumping) together, allowing for a thick mixture that remains relatively strong when it dries. Slip is poured into the plaster mold, which quickly absorbs moisture from the slip, leaving a thin layer of solid clay on the interior surfaces of the mold. Digital fabrication methods including photogrammetry, CNC milling and computer modeling are integrated into the process to push this traditional craft further. Photogrammetry, a technique using photography to survey, map and measure objects in real-time can be used to convert physical items into digital ones. Once the object is digitized there are unlimited options for manipulation. The object is then re-produced physically by a CNC mill, which is a subtractive process that can be programmed to remove material according to the digital model reference. Once the mold is milled, casted in plaster and slip-cast, the resulting object can be re-inserted into the process. This cyclical production loop allows for the continuous manipulation of objects, which can be scaled up or down to fit the needs of the project. Additionally, each step of the process leaves residual marks on the product: seams, textures, grazes from the mill and other imperfections mimic the registrations left behind in ecological transformations. Similarly, the molds used in this process will degrade and erode over time, becoming less precise with each cast.

Using these methods, the thesis proposes the design of a slip-cast block, which is articulated into a vertical surface that is deployed into the earth. The surfaces are arranged into a "well" formation that serve as a public temporal ecological monument. The monument emphasizes temporality, as the slip-cast blocks remain unfired and are therefore very sensitive to changes in humidity and water. Since the wells are dug into the water table, they register the shifting levels of water, as the slip-cast block surfaces erode and deteriorate where they come into contact with water. This cross-sectional intervention into the water table enables people to come into visual contact with their local hydrology and uncovers some of the changing conditions occurring beneath the surface. This intervention seeks to bring people closer to their underlying hydrology, while simultaneously reconsidering the misplaced nostalgia of a pre-industrial "natural" world, in favor of a critical awareness of the shifting ecological times.



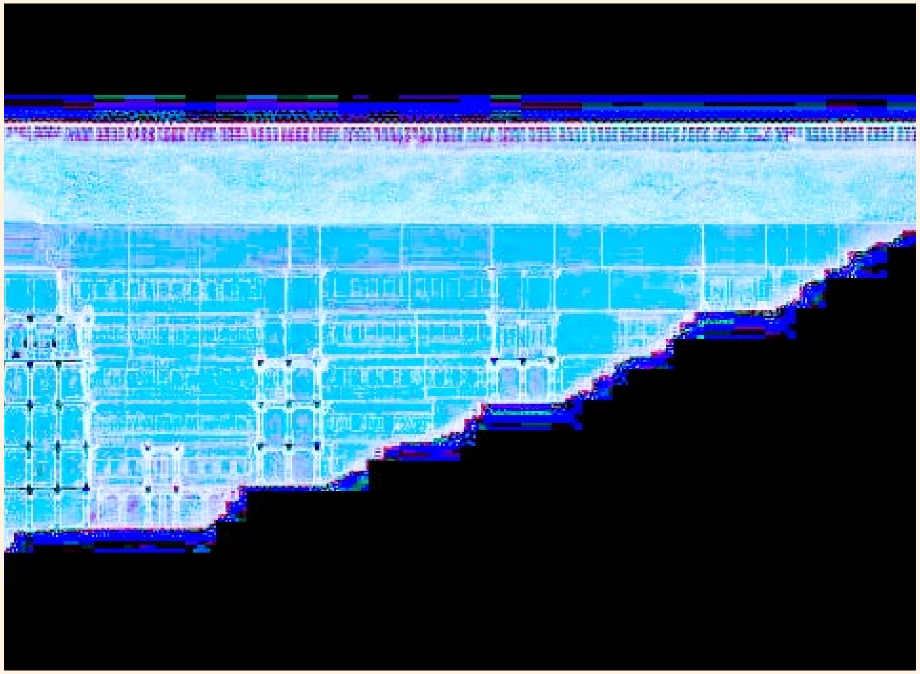
1.1 Cross-sectional drawing of underlying hydrology in North Gujarat, with stepwell

Human intervention of the landscape and climate by damming, filling wetlands and over-extracting is resulting in the rapid perversion of water bodies through the desertification or flooding of terrain and the ensuing contamination of reservoirs. In turn, these changes are disrupting ecosystems, reshaping geological borders, and causing irreversible damage that pose threats to clean water supplies. Water embedded in the earth is a crucial source of both potable water and wet-earth materials for building. However, as the water content levels in these materials are altered, properties such as strength, elasticity and resistance fluctuate, altering their useful functions. As these changes occur deep within the lithosphere, over prolonged periods of time, much of this transformation is imperceptible, leaving an unawareness of the criticality of the issue. Further, a misplaced nostalgia for a "natural" pre-industrialized ecological state is distracting from productive solutions that critically consider the present environment.

This thesis seeks to investigate the behaviors of residual wet matter, a byproduct of hydrological transformations, in relation to the contamination of water bodies. Using clay (a form of wet matter) and slip-casting (a form of industrialized ceramic production) as a medium for testing and simulating the effects of de-hydration and re-hydration on material, the thesis attempts to reveal these changes through the form-making of a temporal ecological monument.

Water is an existential theme. Sea-level rise, coastal city depletion, floods, contamination of drinking sources and scarcity has channeled the discourse of the modern built environment. Yet humans continue to exert agency through influence and intent over their surrounding hydrology, scarcely considering the ecological ramifications of their interventions. One explanation may be the misguided assumption that water supplies are ubiquitous and abundant. Massive municipal and private projects to source, restrain or store water increasingly disrupts existing hydrology in the process.

The city of Ahmedabad in North Gujarat, India boasting a population of 5.5 million, was founded on the banks of the Sabarmati River in the 15th century. The metropolis relies on an expansive dam-canal infrastructure that diverts water from a perennial river to the seasonal Sabarmati River. Groundwater is also extracted from giant municipal wells on the river, working in unison with tube wells that tap underground aquifers. Recently, a series of mega infrastructure projects have fundamentally altered the river's ecology, disrupting its seasonality. One of the most ambitious – the Sabarmati Riverfront Development Project – which uses two large barrages to hold perennial water supplies – paved over the river's floodplains with concrete. Projects such as these preside extreme agency over the natural environment, as Tanvi Jain writes: "such expansionist, extractive and homogenizing infrastructural



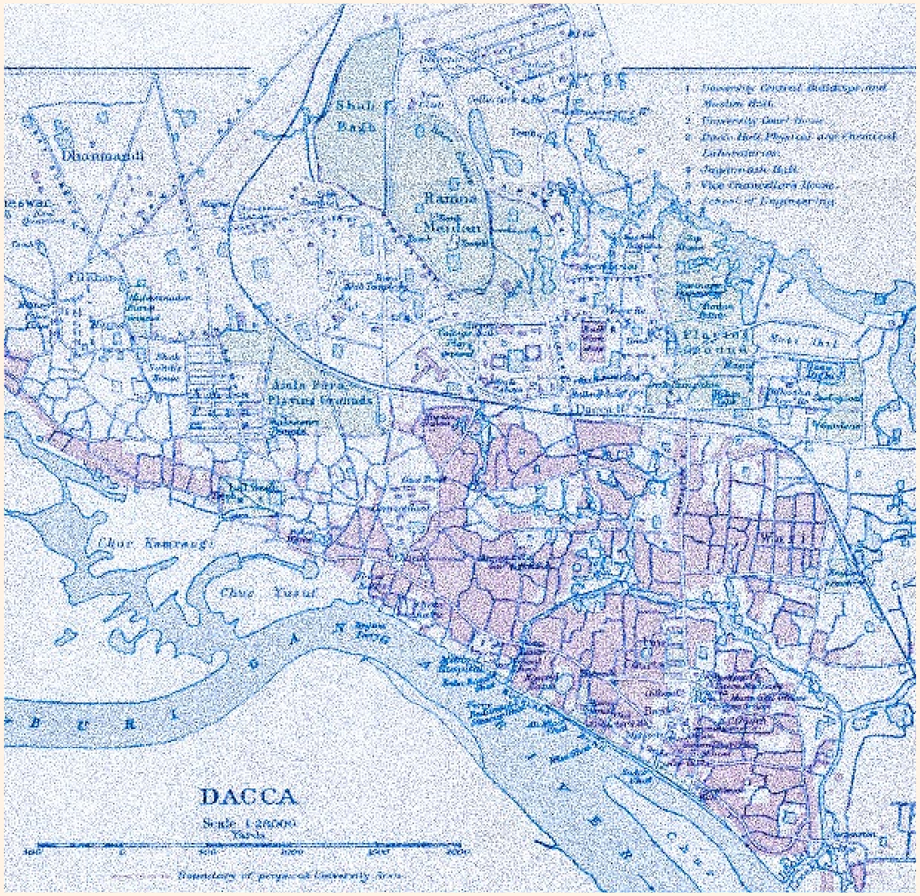
1.2 Partial elevation 3D scan visualization of Rani Ki Vav

growth to supply the city assumes water is ubiquitous and abundant – underscored by the hope for 'limitless fresh water' as a state-guaranteed civic right." This region evolved several methods of fresh water harvesting, most notably the stepwell. These complex structures are ubiquitous in the historic landscape and worked in sync with seasonal rivers, streams, reservoirs and cisterns to sustain the surrounding cities. Stepwells performed functions beyond sourcing water, as they were deeply embedded in the region's social, religious and ecological rhythms.

However, the 19th century brought the degradation of traditional water harvesting systems, reinforced by colonial policies such as land taxes, commodification and the dismantling of community agency over natural resources. In the early 20th century, the colonial state encouraged the use of mechanical pumps to expand industrialization. These technologies pumped out overwhelming amounts of water that didn't allow for the natural seasonal replenishment of wells, causing many stepwells to dry out. The overexploitation of the hydrological landscape continued with large dam projects, the filling of lakes and paving over of watersheds. Today, only 3 of 17 documented stepwells in Ahmedabad still access groundwater[1].

As infrastructural projects require political action and intent for development, the ensuing water crisis is increasingly creating disparity and inequality around access to this vital resource. Geographers Eric Swyngedouw, Maria Kaika and Nik Heynen developed a discourse called Urban Political Ecology which claims that "specific forms of political economy metabolize the urban nature that adheres to new urban spaces and subjectives, while simultaneously unhinging, if not outright dismantling, the relations between existing urban subjects and nature."[2] This approach understands urbanization to be a political, economic, social, and ecological process, one that often results in highly uneven and inequitable landscapes. They raise early twentieth century Parisian street engineering as one such example of a systematic urban production of nature. Streets ensnared water, gas, trees, stone and sewage systems. These spaces were designed to circulate natural matter (water), "leisure-nature" (boulevards lined with trees) and "state-capitalist notions of nature. (the surrounding real-estate). Planners saw the street as a circulatory mechanism for nature - "everything to the sewers" - whereas French urban agitators saw it as - "under the street the beach" – implying the multi-faceted perceptions of this political ecology.[3] Thus, as urbanization takes control over the natural territories it occupies, it begins to prioritize certain conditions.

1-Tanvi Jain, Stepwells of Ahmedabad: water-harvesting in semi-arid India (The Architectural Review, 2021).
2-David Gissen, APE: David Gissen in Design Ecologies: Essays on the Nature of Design (Princeton Architectural Press, 2010).
3-Ibid.



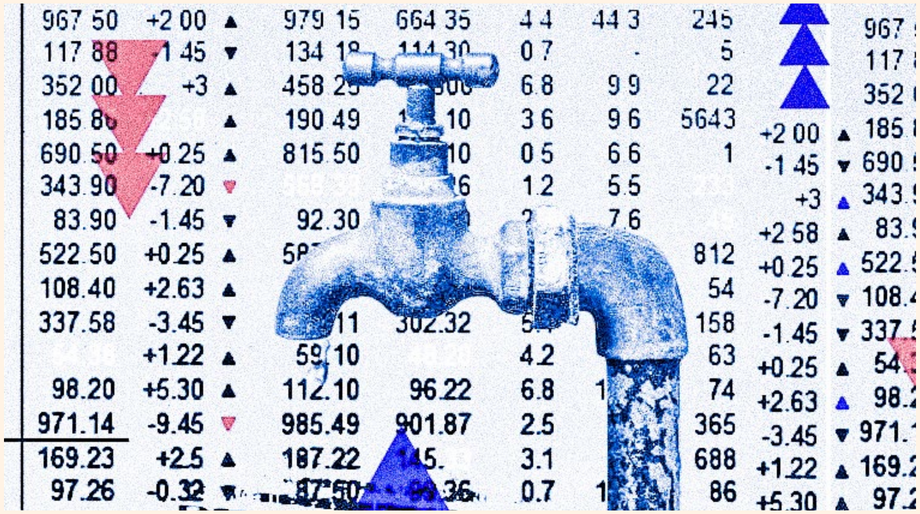
1.3 Dhaka in 1924 as a perpetually porous city, permeated and defined by water.

As further evidence of the human ignorance towards ecological consequences, it is notable that most water-based cities display a clear prejudice towards dry land. Bangladesh's capital Dhaka, for example, emerged from the Bengal Delta. Due to furious landfilling operations, mostly due to real-estate ventures and infrastructural interventions, the landscape has become savaged. "Dhaka is symptomatic of most cities in powerful hydrological milieus and undergoing furious transformations where practices of planning, whether official, private or impromptu have succumbed to the regime of a dry ideology." Chars, or land formations caused by the dynamics of soil-shifts and water flows, rise annually in the delta waters. They appear and disappear annually, while more stable ones become sites of settlement. The chars serve as registrations of earlier river turns and silt deposits. Further, "Dhaka and the delta appear as two separate entities, antithetical and strangers to each other. Fed on dry ideas, planners and policy-makers remain befuddled about envisioning or even managing a city in such a toiled terrain." Most modern urban planning has therefore become an effort to "construct land," – or to "manufacture dryness." Landfills, embankments, bridges and roadways continue to support the technology of a dry culture.[4]

Even as rapid urbanization depletes its occupied territories, there is evidence to suggest that there is increasing awareness of the current hydrological situation in most regions of the world. Most notably, the capitalistic approach towards the commodification of resources including water suggests there is an awareness of the precarity of water availability and an effort to "insure it." David Gissen, Professor of Architecture and Urban History at the Parsons School of Design, describes a capitalist world with a "rapidly expanding economy that transformed nature into a resource, urban space into investments and ideas into consumerist spectacle."[5]

It seems then, that the response to the condition of precarity, humanity is quick to ensure the precarious. In doing so, there is an inherent alienation. Anthropologist Anna Tsing suggests that the entanglement of the human race with capitalism has alienated humans and other beings into resources. She points out that these systems have segregated humans and policed identities, obscuring collaborative survival: "we imagine precarity to be the exception in the world, but it is suggested that precarity is the condition of our time. Precarity is the condition of being vulnerable to others, as unpredictable encounters transform us; we are not in control, even of ourselves, we are thrown into shifting assemblages, which remake us as well as our others.

4-Kazi Khaleed Ashraf, Wet narratives: architecture must recognize that the future is fluid (The Architectural Review, 2017).
5-David Gissen, Introduction in Territory: Architecture Beyond Environment (Wiley, 2010).



1.4 Water as a traded commodity

Everything is in flux, including our ability to survive."[6] In Autumn Aroma, Tsing explains that humanity must now focus on exploring indeterminacy and the conditions of precarity, that is, life without the promise of stability. These new conditions must address the imaginative challenge of living without the "handrails" which once made us think we knew, collectively, where we were going.[7]

This precarity has, among other things, created a demand for the insurance of natural resources. As countries and regions around the world are experiencing droughts and ensuing water crises, starting in 2020 this vital resource was first traded on the stock market. The introduction of trading water futures has been described a sort of "risk management" of water. The regulated exchange now assigns a price to water, based on regional availability.[8]

An article from the ERB Institute at the University of Michigan similarly relates the concerns around water scarcity to the expansion of industries around water commodification, ranging from desalination to dam construction to bottling water. There is clearly an increase to privatize and sell water.[9] In regards to this type of commodification of vital resources, Tsing writes: "There is one connection between economy and environment that seems important to introduce up front: the history of the human concentration of wealth through making both humans and nonhumans into resources for investment. This history has inspired investors to imbue both people and things with alienation, that is, the ability to stand alone, as if the entanglements of living did not matter. Through alienation, people and things become mobile assets: they can be removed from their life worlds in distance-defying transport to be exchanged with other assets from other life worlds, elsewhere. Alienation obviates living-space entanglement."[10] Even as the market trades water futures, these forms of ensuring the security of natural resources remains mostly inaccessible to those most affected by the rapid degradation of the environment, and most at risk to water scarcity. Therefore, as many of the entities that are initiating the very same interventions causing water scarcity to continue to commodify nature, there continues to exist an overwhelming ignorance towards the rapid deterioration of hydrological bodies in cities most reliant on them.

6-Anna Lowenhaupt Tsing, Arts of Noticing in The Mushroom at the End of the World (Princeton University Press, 2015).
7-Anna Lowenhaupt Tsing, Autumn Aroma in The Mushroom at the End of the World (Princeton University Press, 2015).
8-California Water Futures Begin Trading Amid Fear of Scarcity (Bloomberg, 2020).
9-Allison Torress Burtka and Wren Montgomery, A right to water (ERB Institute, 2018).
10-Anna Lowenhaupt Tsing, Autumn Aroma in The Mushroom at the End of the World (Princeton University Press, 2015).

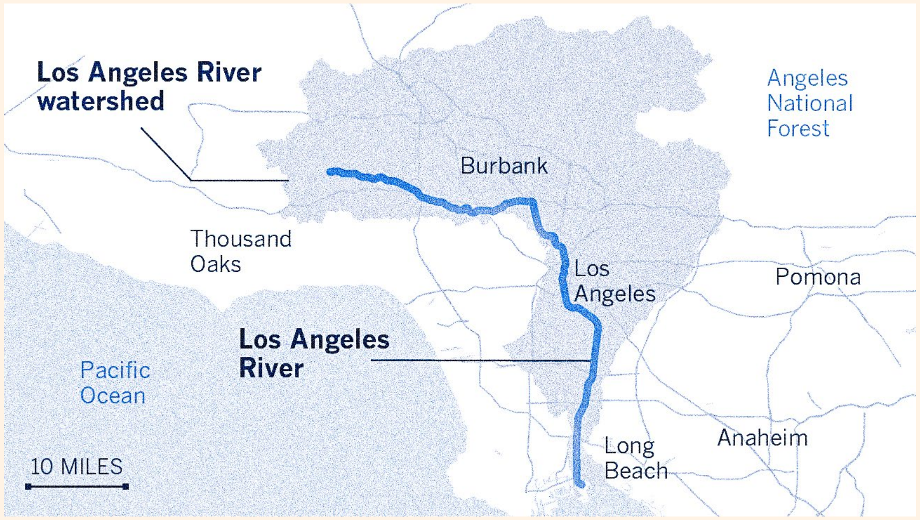
1.5 View of the Los Angeles River

The general unawareness of shifting conditions is further induced by the existence of a misplaced nostalgia for a "natural" pre-industrialized ecological state, which distracts from productive solutions that critically engage the current environment. Humans are naturally nostalgic, sinking into comforting collective memories. Yet these same memories are often distorted by external stimuli and current phenomena, which can influence or completely alter them.

One explanation for the existence of this misplaced nostalgia around ecology may be the overly optimistic portrayal of human progress through the lens of the industrial revolution. This period marked a transition from hand production methods to machines, new chemical manufacturing and the increased use of steam and water power. However, this narrow lens of the celebration of progress often fails to consider the countless ecological consequences it produced.

In Arts of Noticing, Anna Tsing suggests that the industrial transformation was a bubble of promise followed by lost livelihoods and damaged landscapes: "if we end the story with decay, we abandon all hope - or turn our attention to other sites of promise and ruin, promise and ruin… we are stuck with the problem of living despite economic and ecological ruination. Neither tales of progress nor of ruin tell us how to think about collaborative survival."[11] This narrative of ruination has become increasingly prominent in modern urbanization surrounding water bodies. Recently, the tendency is to respond to this ecological ruination by "reversing" the human imposed interventions. This suggests that another reason for the prominence of the misplaced nostalgia surrounding the environment is the general misunderstanding of what pre-industrial fluid ecologies were like, as argued by landscape architect and urban designer, David Fletcher in Flood Control Freakology. His description of the Los Angeles River as a fully engineered flood-control system is an example of a "freakish ecology," no longer a natural, aqueous phenomenon, but a man-made web of vascular networks, many of which channel other flows besides water: freeways, streets, railways, power lines, cell towers, as well as sewage infrastructures. Embedded within the fabric of the watershed are political structures and bureaucracies, environmental conditions, economic organizations and cultural relations.[12] As a result of the vast interventions and systematic hydrological re-configurations, the river has ceased to exist as a single entity, rather it is a jurisdictional matrix of boundaries, rights-of-way, easements and liabilities: a zone comprised of an invisible pattern of ownership and maintenance jurisdictions, railroad lands and utility easements where federal, state, county, city and private territories overlap.

11-Anna Lowenhaupt Tsing, Arts of Noticing in The Mushroom at the End of the World (Princeton University Press, 2015).
12-David Fletcher, Flood Control Freakology (Actar, 2008).



1.6 The Los Angeles River and watershed

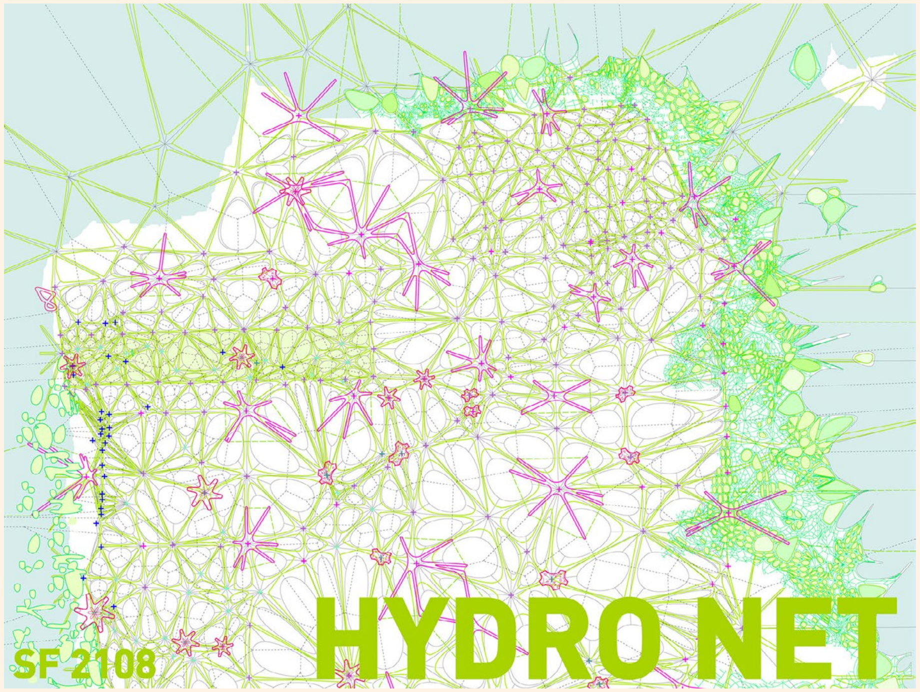
These interventions may give the impression that the river isn't even a river at all anymore. Fletcher counters this perception, claiming that the river did not exist in the summers in the unurbanized past, due to its flow being seasonal. This makes it more of a river now than ever before due to its continuous flow after human intervention. These transformations have been significant to the river's ecology as well, introducing new vegetation and organisms. "The present river ecology is a churning soup of exotic and native vegetative communities that have been introduced since the nineteenth century, some by design, others by accident… colonizing the river's naturalized reaches." He notes that these new invasive species and biomass are constantly introduced to the river through wind and storm drains: "the infrastructural ecologies are systems in uneasy equilibrium.

The naïve desire to return the river to a "natural" state amidst an asphalt metropolis is, in fact, a threat to the urban ecologies that have emerged in response to the river's modifications. Many of these infrastructural freakologies serve as green infrastructures, cleansing and processing excess nutrients, controlling erosion, and providing habitats which survives independent of human agency."[13] The transformation of this river is evidence of the need to move forward with the consequences of human intervention instead of attempting to "restart" and repair it. The reasoning for the recent tendency towards these processes likely lie in the increase of conservationist movements. However, this tendency is naïve, as modern nature and technology contain an inseparable web-work of human agency.

Gissen suggests that rather than using architectural technology to return nature to an impossible, pre-human, pristine state, we might consider fully employing the power of the architectural to uncover and produce new forms of nature. These new forms might offer a more socially complex and challenging image of nature forcing us to reconsider how the nature produced in buildings limits or furthers our social desires.[14]

Thus, instead of rescinding and repairing human intervention, it is imperative that humanity examines its impacts on the environment and how it impacts humanity. However, to best understand how these changes will affect humanity into the future, it is important to consider the relationships humans hold with ecology, ruination and the perception of progress. Historically, humanity has fetishized nature, which has also contributed to the misplaced ecological nostalgia. Menageries, private collections of wild animals kept indoors by the aristocracy in the 1900s, are re-emerging across design, for example. Like a living cabinet of curiosities, the exhibition was from one's travels.

13-Ibid.
14-David Gissen, APE: David Gissen in Design Ecologies: Essays on the Nature of Design (Princeton Architectural Press, 2010).



1.7 IwamotoScott's Hydro Net, created for a 2008 competition to re-envision San Francisco

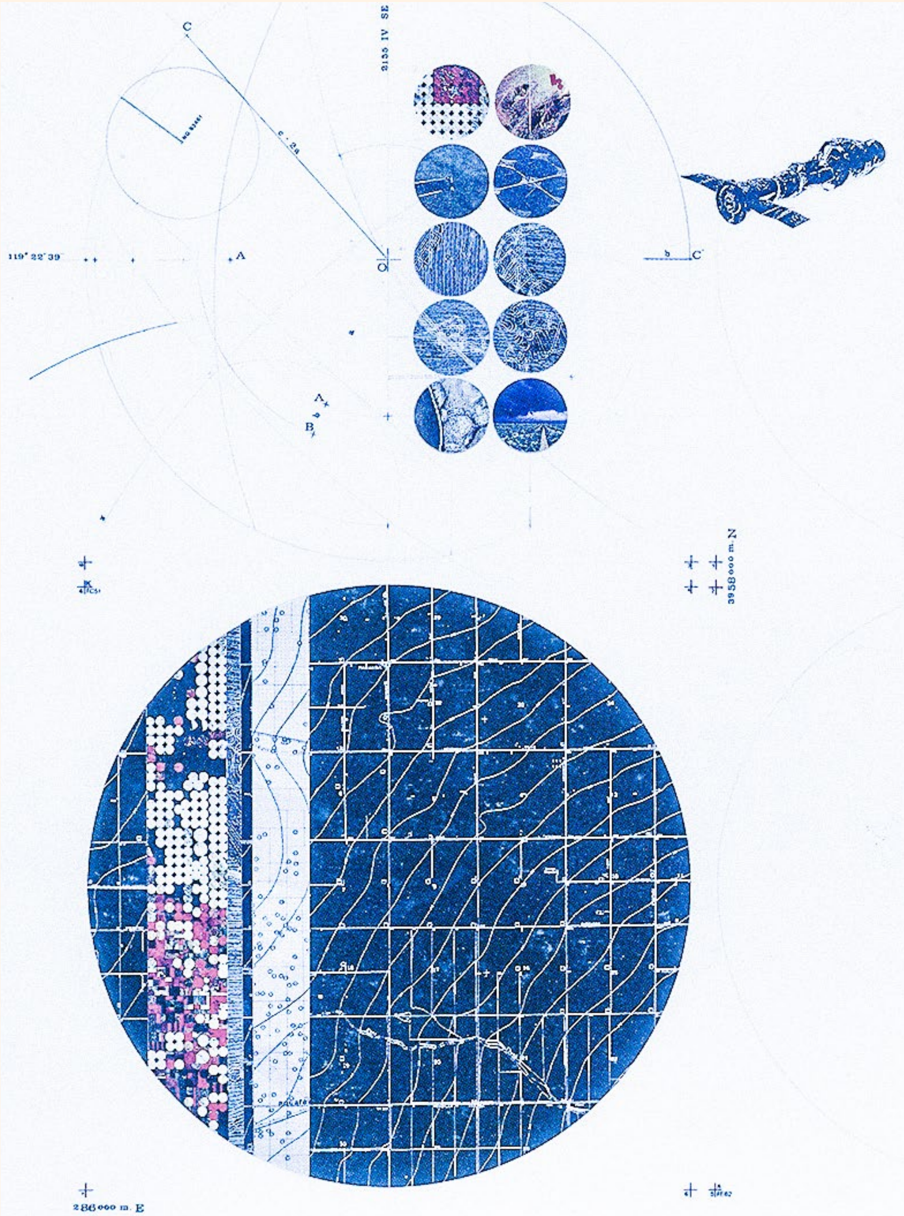
Changes in the climate are likewise driving people to bring nature indoors once more, to fetishize it under glass.[15]

Although there is a prevailing longing to return to pre-industrialized "nature," it is worth considering that the "natural" versus "man-made" argument may be a false dichotomy altogether. Such dichotomies draw a distinction between two opposite notions, which leads to a strict "either/or" perspective, regarding them as mutually exclusive concepts. Yet it is suggested that many dichotomies, including the natural/un-natural are inherently false, as the two are synchronous. In Re-envisioning the Hydro Cycle, Rebecca Farnum, Ruth Macdougall and Charlie Thompson reference Castree's suggestion of a society-environment nexus, or a networked series of connections, rather than a dichotomy, shaped by a dialectic synthesis between humans and their environment. Referring to Swyngedouw, who explores how "water and society make and remake each other over space and time" through a hydrosocial cycle, the authors point out that the flow of water is very much also saturated with "all manner of power relations."[16]

Likewise, Gissen argues that at this point, all nature is produced, as there is no longer "natural" matter outside human reach or impact on Earth's surface. No part has been left untouched, as all nature is laced with human agency and structure. He adds "because human beings can, at an instant, affect all nature anywhere on Earth, the decision to "leave nature be" can be considered a human production of nature."[17] This suggests that nature is a chiefly social production, emerging as a site of overcoding, where nature is attributed particular powers as different images of nature stand in conflict. This concept of assemblage suggests that nothing can be studied in isolation, as ecological and anthropological systems are all inherently interdependent.

Tsing further discusses how the varied species in an assemblage influence each other: some thwart each other, others work together to make life possible, others simply find themselves in the same place. It is critical to think through assemblage, as it urges the consideration of how gatherings sometimes become "happenings." That is, greater than the sum of their parts. By studying patterns of assemblies in the world's ecology, patterns of unintentional coordination emerge in these assemblages. Because they are interrelated to the needs and desires of humans, assemblages drag the political economy inside them.[18]

15-Sarah Rabia and Collyn Ahart Chipperfield, Imagination Building (Wiley, 2010).
16-Rebecca L. Farnum, Ruth Macdougall, Charlie Thompson, Re-envisioning the Hydro-Cycle
17-David Gissen, APE: David Gissen in Design Ecologies: Essays on the Nature of Design (Princeton Architectural Press, 2010).
18-Anna Lowenhaupt Tsing, Arts of Noticing in The Mushroom at the End of the World (Princeton University Press, 2015).



1.8 James Corner's "Pivot Irrigators" diagram

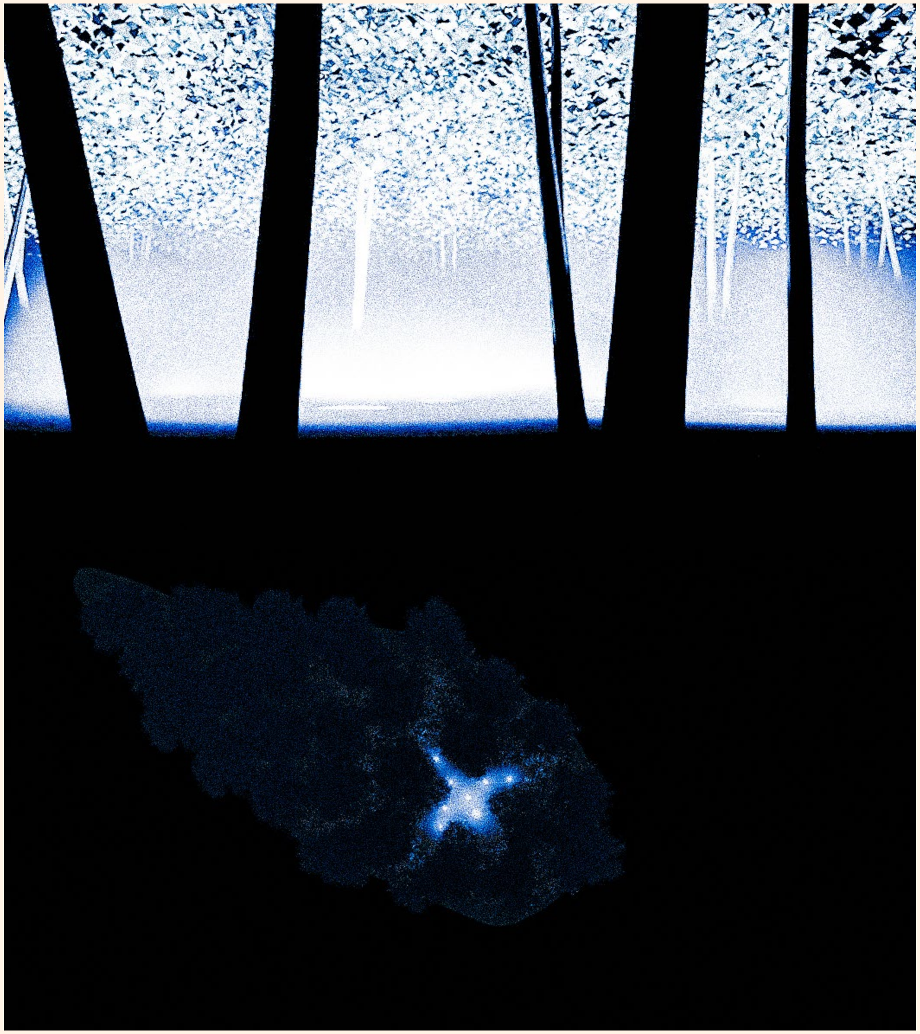
As further evidence of this false dichotomy, landscape architect James Corner suggests that the very essence of architecture and territory is representative of humanity's control over the environment, rendering them inseparable.

In Amphibious Territories, Corner examines the re-organization of terrain when it is cleared: "the deterritorialization of property suggests a condition where there is in fact no single power or authority but rather a mass collection of individual choices and actions…the ensuing result can be completely open and unregulated, thereby conflating questions of hierarchy, control and power.[19] When examining the authorities of de-commissioned territory, it is critical to identify the residual substances and programs that are the product of the territory. In Landscraping, Corner references landscapes that are closed down, voided and left to nature. This is presented in the form of a cleared, de-commissioned terrain that is essentially empty of references, representations or programs. Corner therefore suggests that empty spaces are not simply left-over results of desertion but rather of construction: they are intentionally "set-up" and staged as open grounds for wholly indeterminate futures. Decommissioning and reallocating resources is an inevitable aspect of the urban economy.[20] This implies that territory never actually loses its coded meaning. Corner proposes instead of "scaping" the land into a formal composition of meaning and presence, it is much more prosperous to examine possibilities for "scraping" the land of its various residues: symbolic, political and material.

The scraped ground then becomes an empty field of absence that accommodates multiple interpretations and possibilities.[21] As previously discussed, the understanding of territory as being inherently laced with human agency suggests an architect is simply re-coding or re-programming territory. In Territory: From the Biological to the Geological, architectural theorist Stan Allen suggests: "landform building is less interested in the imitation of natural form and more interested in new programmatic possibilities that are opened up by the creation of artificial terrains. Landform building favors program, process and affect over formal similarity. It can suggest a productive new approach to sustainability and enhanced environmental performance in which form – rather than technological fixes – can play an active role.

Landscape is no longer viewed as pure exteriority – as the nature or wilderness out there – but is understood as an immersive environment.[22] If the site upon which these constructions appear is deeply encoded, then so are its materials and the matter that constitutes it.

19-James Corner, Landscraping in The Landscape Imagination (Princeton Architectural Press, 2014).
20-Ibid.
21-Ibid.
22-Stan Allen, Territory: From the Biological to the Geological



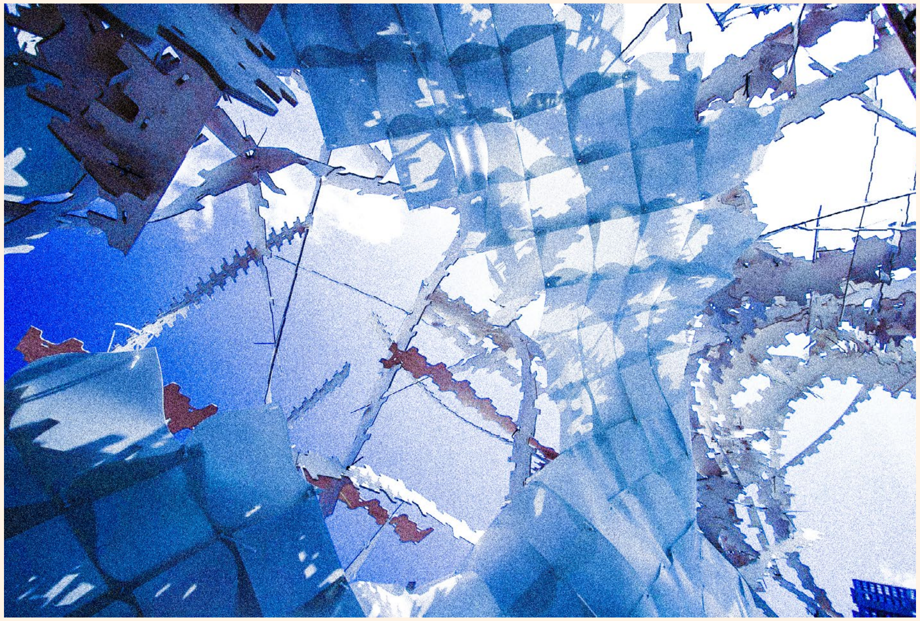
1.9 Philippe Rahm architect's Second Summer temporal installation in Eybesfeld, Austria

Humanity has altered and manipulated the environment for millennia, re-programming it for agricultural production, dwellings and convenience. The prominence of these human transformations has led geologists to label the current geological age the Anthropocene, viewed as the period which human activity has been the dominant influence on the environment and its territories. Gissen similarly labels this production of human and animal environments as terraforming. He notes that buildings actively produce or wrap the socio-natural conditions around the architectural object. Architecture here becomes a material and theoretical 'genesis device – a machine that makes environments but also ideas about nature and environments.'[23] Although all nature has become inherently laced by human agency as these theorists suggest, there remains a lack of representation and therefore general mis-understanding of the influence of human intervention on the environment. As such, the misplaced nostalgia of a pre-industrialized and human altered world, rooted in the mis-remembering of an environment absent of human actors continues to persist.

Although overarching unawareness and a nostalgic pull towards a false reality is symptomatic of the Anthropocene, this thesis argues that through critical interventions, notably in the form of "temporal monuments," there can begin to be a catalyst for the procurement of an awareness of the ecological situation of our time. Monuments are erected for a variety of purposes, typically to commemorate a significant person or event. They exist in spaces as a marker of a series of ideas or histories related to the geographical location upon which they stand. In Territory, Architecture Beyond Environment, Gissen suggests that monuments emerge as complex territorial assemblages of natural and urban web-works. He states that monuments bring the routes, aesthetic ideas, rendered natural materials and investments into focus and into existence, just as these aspects represent a system that enables the monument's construction. Monuments are designed to evoke specific emotions and reactions in the viewer. They can be integrated into the local context or exist as prominent outliers. The power in these monuments is their ability to enable a deeper understanding of the possible realities lurking in the world.[24]

The "territories" which host monuments are equally significant, acting as the datum for their purpose. Gissen defines territory in this context as a produced (versus given) environment generated by a combination of architectural concepts and architectural and natural matter that is always in a state of its own realization.

23-David Gissen, Introduction in Territory: Architecture Beyond Environment (Wiley, 2010).
24-Ibid.



1.10 Situ Studio's Solar Pavilion

The built environment is thus directly encoded by the territory it occupies. Gissen adds: "the structures assembled on these territories attempt to recode their surroundings… these assemblies are simultaneously autonomous and integrated in the landscape as artefacts in a territory. They serve to articulate an environment within the environment, as possible foreclosures between science, nature and art."[25]

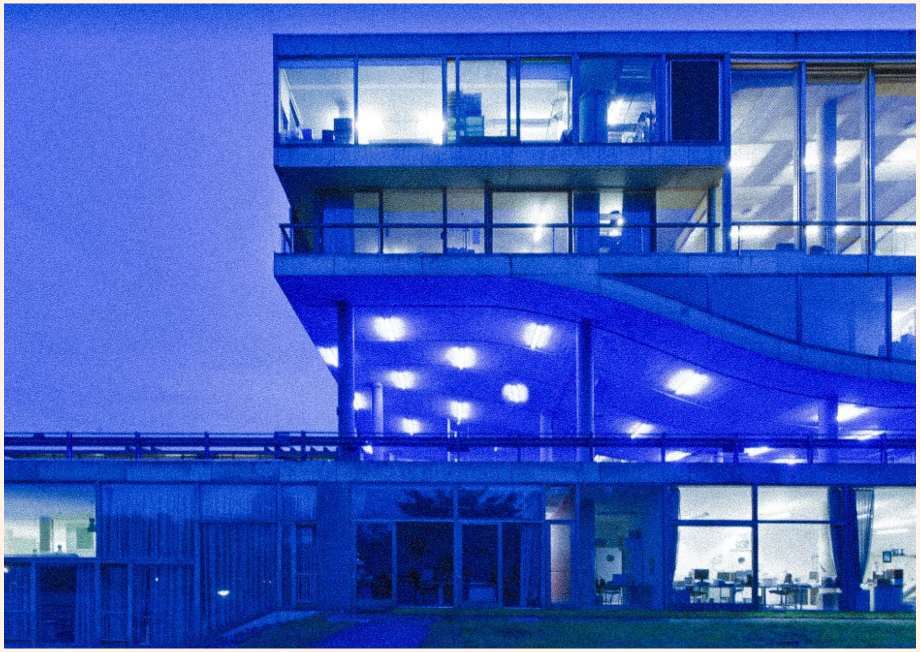
Depending on the stakeholder, natural spaces can change in purpose and function. Thus, these spaces are coded in relation to the socio-political conditions in which they were produced. Gissen suggests that this type of political ecology might inspire historical work on architecture's interaction with nature, going further as to examining the natures that move through the production of architectural and social history itself. He raises archives, historical reconstructions and museums as concepts and sites bursting with complex political ecologies of their own, as museums maintain very strict environmental guidelines to assist in acquisition, maintenance and the experience of historical artifacts. An architectural political ecology, may in turn, engage with some of the most troubling forms of nature produced by the very act of building.[26] By building in consideration of these residues, the design is better integrated and pragmatic in relation to its host territory. In Why Site Matters, Carol Burns and Andrea Kahn similarly argue that design does not simply impose on a place, as the site and designer engage in a dialogic interaction, where a site acquires design meaning only through its apprehension, intellectually and experientially. Therefore, they claim the site as a relational construct that acquires meaning and value through situational interaction and exchange. This relational condition of the site derives from uninterrupted exchange between the real and the representational; the extrinsic and the intrinsic, the world and the world-as-known.[27]

It is also important to consider the significance of temporality in interventions. Temporality allows for iteration, and therefore optimization of the design to its respective environment or territory. In Out of Control: Experiments in Participation, Situ Studio describes their small-scale experiment of a temporary deployable structure of a solar pavilion which has allowed them to test hypotheses about local rules of assembly at an architectural scale. Their aim was to experiment with the output potentials of local digital fabrication and to create an open construction system that encourages participation and prohibits a repeatable configuration, with the goal to defer the aspect of indeterminacy to the actual on-site construction process, rather than within the design process.

25-Ibid.

26-David Gissen, APE: David Gissen in Design Ecologies: Essays on the Nature of Design (Princeton Architectural Press, 2010).

27-Carol Burns and Andrea Kahn, Why Site Matters in Site Matters (Routledge, 2020).

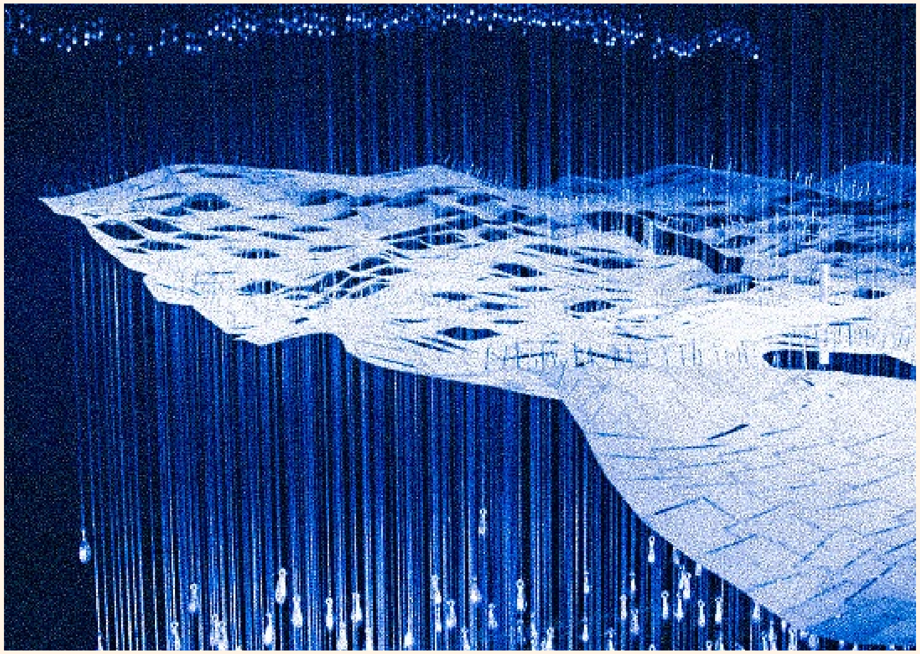


1.11 MVDRV's Villa VPRO

A universal connection along components' edges allowed for sufficient freedom to force indeterminacy and variability in each assembly event. They discovered that forces in the structure would take a few days to reconfigure themselves under slight changes in temperature and humidity. Only through full-scale testing they could gain an awareness of how the macro-characteristics of the whole depended upon the sequencing of construction and time-scale of its various micro adjustments. Over the life of the pavilion, notations were made to indicate certain configurations that worked especially well. The simplicity in the pavilion's rules, and the fact that small quantities of customized components can be economically manufactured and assembled offers a hypothesis for new systems of decentralization in the construction of local environments. Thus, the aspect of participation is extended beyond the design stage into the fabrication and construction stages.[28]

The dynamic nature of this intervention is further evidence of the effectiveness of temporal monuments, in terms of their connection to their respective territories and responsiveness to changing phenomena. Stan Allen in From the Biological to the Ecological suggests that buildings interact with, and adapt to, the work-life of its inhabitants. Using MVRDV's Villa VPRO completed in 1997 as an example, he claims that the innovation of the project at the time was to claim the building is not something that occupies the site but rather that the activity of the architect is to construct the site. Landscape implies process and change, not form: it cannot be designed and controlled as a totality but instead must be projected into the future and allowed to grow in time.[29] Allen likewise suggests that in the past two decades, there has been a desire to make architecture more lifelike, more fluid, adaptable and responsive to change. These contemporary strategies suggest that the architect does not so much imitate the forms of nature as model the natural process of form generation. He explains that although this has produced compelling formal results, there are conceptual and procedural limits – a lot of these structures are static although their design generators are dynamic. "The forms generated may resemble nature, but they retain little of the performative or adaptive complexity of life itself." He notes that despite advances in fabrication technology, a large gap still exists between the forms generated by the software and the intractability of materials.[30]

28-Situ Studio, Out of Control: Experiments in Participation.
29-Stan Allen, Territory: From the Biological to the Geological.
30-Ibid.



1.12 Yusuke Obuchi's Wave Garden is a prototype for a dual-function power plant and park

The short-comings of this digital to physical pipeline remain as major obstacles to the interpretation of form and design. Additionally, issues of representation can begin to determine the way territory and site are interpreted, as Corner suggests in Landscraping in The Landscape Imagination: "instruments of representation allow developments in the techniques of description.

Graphic tools inform how designers think. Thought is both allowed and constrained by formats (plans, sections, maps, photography, video), scale and scope, and informational frames of reference." Temporal phenomena (such as hundred-year flood lines) or otherwise hidden factors, assimilates situational influences to the site to support relational understandings. Physical material contact delivers experience and perception. Direct material physical encounters with sights, sounds, smells and textures yields yet another body of site knowledge. Bracketed through subjective experiences of phenomena.[31] Temporal monuments can therefore act as effective registrants of temporal phenomena, revealing change over time in a clear and compelling way. They adapt to the changing conditions and territories they inhabit, while simultaneously indexing the coded layers of agency and human influence that act upon them.

In contrast, there is also evidence to suggest that temporal monuments are ineffective interventions, as they can only exist as permanent structures or systems, which become deeply and fully embedded into their respective territories. Architectural assemblies for example, are often considered to be permanent structures, built to endure and persevere through changing conditions of weather, time and politics. In Amphibious Territories, architectural theorist Ila Berman elaborates on the architectural tradition that has been historically engendered by the values of firmness, stability and permanence. These modern infrastructural artefacts have promoted static, discrete and formal systems over mobile, continuous and material ones. Generally, not integrating the concept of fluid geography and the logics of continuous mutable ecologies into their development. "Operative traits of the real; continuous intrinsic to natural matter that reveal the forces responsible for its genesis. Deformation of an inhabitable artificial geography, challenges architecture to imagine itself as an open territory and dissipative device – a dynamic material mediator."[32]

When considering the purpose of a designer within the context of these ecological shifts, it is important to consider the tools architects deploy to shape the built environment.

31-Carol Burns and Andrea Kahn, Why Site Matters in Site Matters (Routledge, 2020).
32-Ila Berman, Amphibious Territories in Architectural Design Magazine (Wiley, 2010).

1.13 Strait of Hormuz Grand Chessboard: an anthropocene architecture

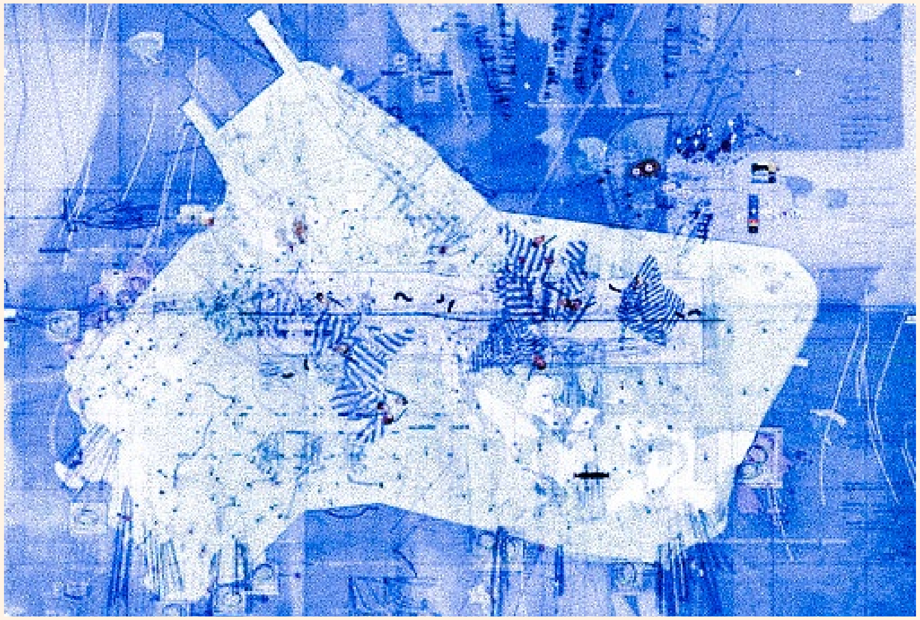
Stan Allen claims that "architecture is situated between the biological and the geological – slower than living beings but faster than the underlying geology. Resistance and change are both at work in the landscape: the hardness of the rock and the fluid adaptability of living things." He continues stating that ecologies, unlike buildings, do not respect borders. Instead they range across territories and establish complex relations operating simultaneously at multiple scales.[33]

When considering scale, it is notable to consider that the materials involved in the construction of monuments and their inherent limitations may also promote the permanence of the built environment. Wet-earth materials and alloys (clay, silt, concrete) are especially seen as unruly and complicated. Architects have long sought to control and harness the properties of this type of matter, however most existing material processes seek to control and contain material behavior.

In Matter Matters, artist and philosopher, Manuel DeLanda claims that physical information pervades the world and it is through its continuous production that matter may be said to express itself. He defines material expressivity through the notion that expression has gone beyond the production of information to include its active storage and processing: "matter expresses itself in many ways, from the simple emission of physical information to the deliberate use of melody and rhythm. The universe itself may be viewed as a grand symphony of material expressivity."[34] Current representational methods are also limiting the way transformations are perceived, giving the misleading notion of permanence. In Environmental Visualization in the Anthropocene: Technologies, Aesthetics, Ethics, Carruth and Marzec explore ways that technologies and media of environmental imaging can be unruly and revelatory. They explain that visualizations can playfully and powerfully explore ideas of resilience, adaptation and synthetic ecologies in the Anthropocene. This alternative visual aesthetic needs attention in an age marked by ideologically conservative forces that seek to govern how communities around the globe visualize and imagine possible ecological futures.[35]

There are also often gaps caused by representation. Architect John May considers this in The Becoming Energetic of Landscape: "there is a disjunction between automated observation and human representation. Landscape is not a primary or mutable datum upon which energy is organized; it does not exist beyond or prior to the geometrical organization of territories, or the residue

33-Stan Allen, Territory: From the Biological to the Geological
34-Manuel DeLanda, Matter Matters in Domas (Domas, 2005).
35-Alison Carruth and Robert Marzec, Environmental Visualization in the Anthropocene: Technologies, Aesthetics, Ethics (Duke University Press, 2014).



1.14 Perry Kulper's Island Strategic Plot Drawing

of material life; it does not "contain" the detritus of social processes, nor is it a 'construct' of those processes. We must develop some understanding of the technologies and practices that treat the landscape as their principal object of inquiry. How are the facts of this conceptual object established, its truthfulness made evident? What discourses and instruments do we surround it with? How do we represent it, how do we visualize it?[36] It becomes evident then that permanence in regard to monument is a false perception, brought about by representational gaps and material limitations. Architect Perry Kulper elaborates on this in The Precision of Promiscuity by arguing that the mediums, techniques and design methods architects conjure are approximate and indirect or outright mischievous. He suggests that architects "pick the pockets of truth, acting like con artists, leveraging sleight of hand tactics." He continues: "Architects work in all kinds of ways – 2d, 3d and temporally changed visualizations, models, objects and invented bits, in fact, never before has the range of techniques to drive design been so robust."[37] As Kulper suggests, such Technological advancements are increasingly bridging these gaps and challenging traditional material manipulation. Augmented reality for example, in its process to overlay computer-generated information on to the real world and vice-versa, promises to truly blur fantasy and reality. BT visionary Ian Pearson believes AR will mean we can fashion the way we experience environments.[38]

By utilizing technological advancements, acknowledging the notion of the misplaced nostalgia and by working through a critical lens, humanity can begin to move towards a more productive future ecology.

In Amphibious Territories, Ila Berman writes: "as the discreet architectural object is stretched to the scale of geographical, a new monumental nature is created – one that is highly articulated and deliberately defined, yet also fluid and material in its evolution, operation and effects. In turn, this should challenge us to incorporate soggy spaces of porosity, elasticity and growth within our static and solid waterproof environments, just as they also enable us to imagine new opportunities for amphibious infrastructures and architectures that attempt to synthesize technological artifice and its discrete acculturated systems with the fluid geographies and vital ecologies of a continuous material nature. Bays, rivers and wetlands adjacent to our urban centers, have remained conceptually and physically under engaged, except by those invested in infrastructures intended to control and restrain them.

36-John May, The Becoming-Energetic of Landscape in Landscapes of Energy: New Geographies (Harvard GSD, 2010).

37-Perry Kulper, The Precision of Promiscuity (Offramp, 2015).

38-Sarah Rabia and Collyn Ahart Chipperfield, Imagination Building (Wiley, 2010).

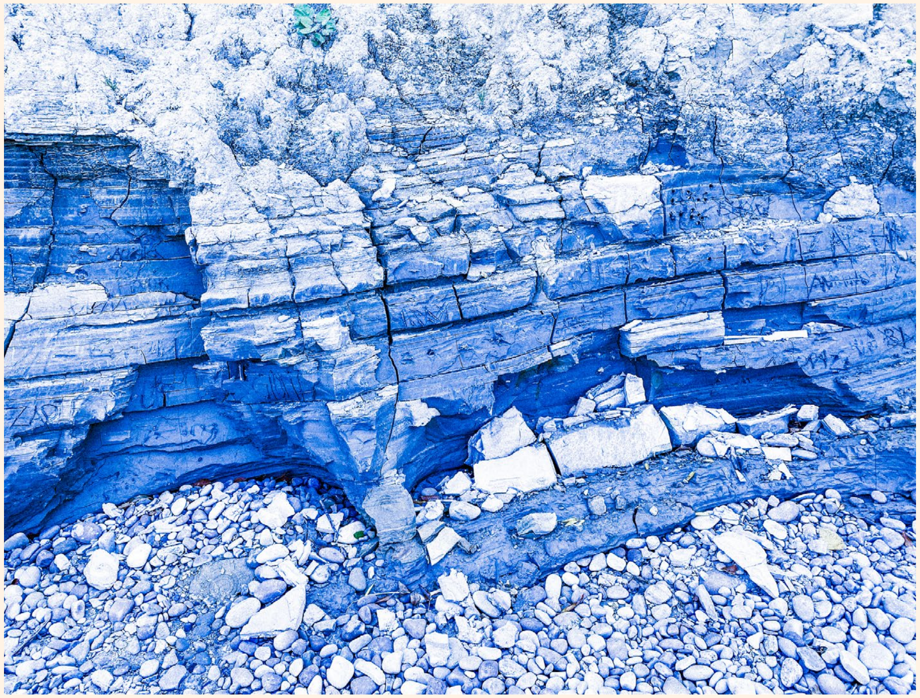
1.15 Anderson Anderson Architecture's Alluvial Sponge Comb prototype at the 2006 Venice Biennale

The complexity and boundlessness of this liquid landscape has yet to be fully explored, for the dynamic potential it offers for amphibious urban life as well as its provision of a future territorial frontier for expanded architectural expansion.[39] Due to the human interventions that have reshaped the hydrological landscape, there is a need for architecture that better adapts to a more porous and engaged narrative with water. Working in unison, not against, water will be the most productive action to dismantle false perceptions of the pre-industrialized environment, and to procure awareness of the current ecological state.

39-Ila Berman, Amphibious Territories in Architectural Design Magazine (Wiley, 2010).

Thesis Preparation

Investigations began with the extraction of material at natural sites. A clay deposit was identified at Chimney Bluffs State Park, located halfway between Syracuse and Buffalo, NY on Lake Ontario. This site features unique "bluffs" that are formed from eroded drumlins, or tear-drop-shaped hills of glacial deposits formed during the most recent ice age. Wind, rain, snow and waves from the lake further eroded these bluffs into sharp pinnacles. These bluffs continue to erode at an average rate of one to five feet per year.

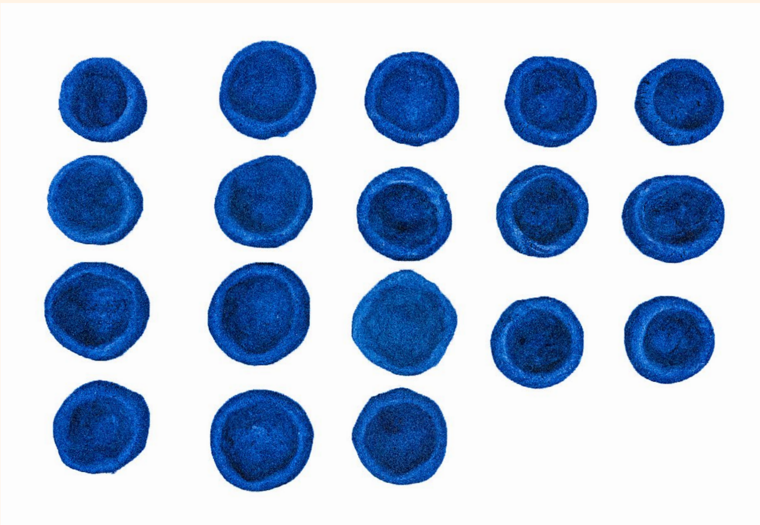


2.1 Clay extraction site

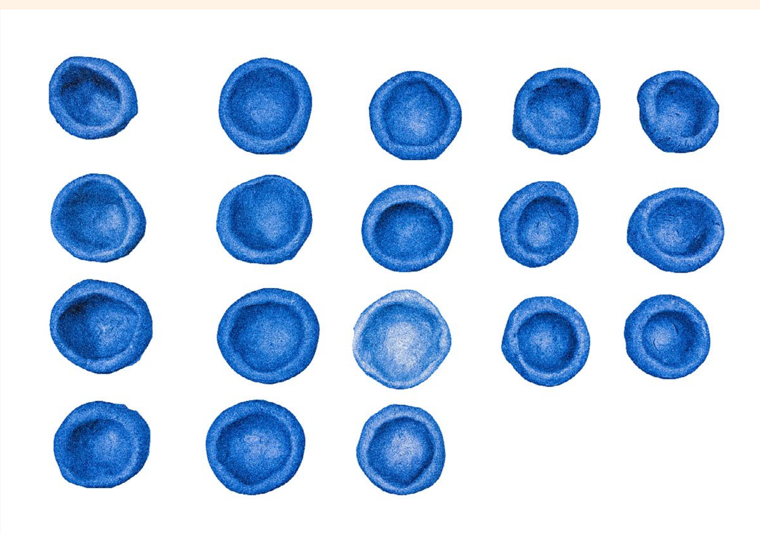
2.2 The bluffs, formed during the last ice age

At the base of the bluffs, the clay deposit presents itself as a series of "cracked" nuggets along most of the coast line. A small portion of clay was extracted by an ice cream scoop and sealed in an air-tight container to be used for further testing in the studio.

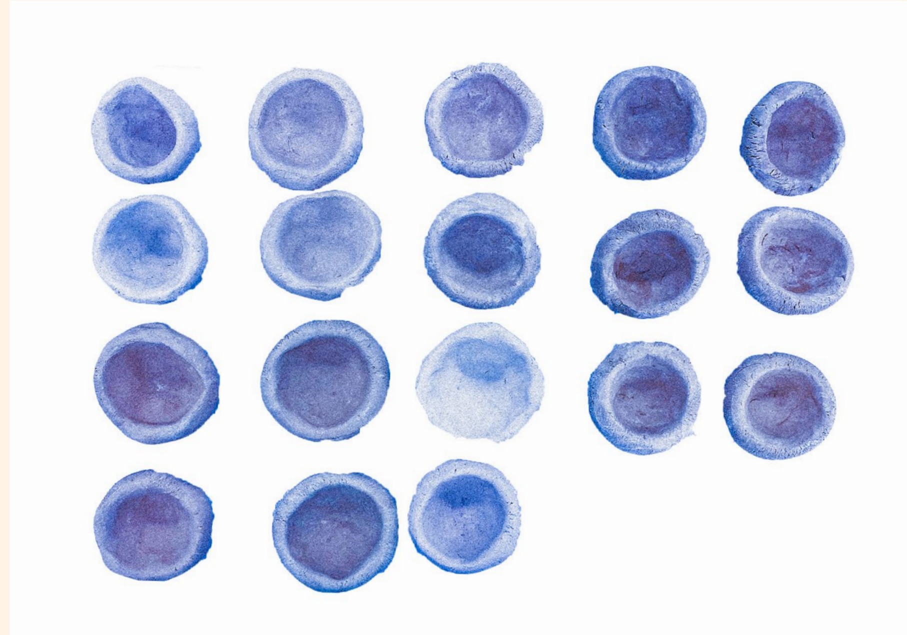
The sourced clay was then mixed in various amounts with purchased "clay-body." Clay-body is a mixture of specific clay types and most often used in the studio due to its increased tolerance to heat and ideal elasticity. These clays were proportioned, mixed and formed into pinch pots.



2.3 Wet clay formed into pinch-pots



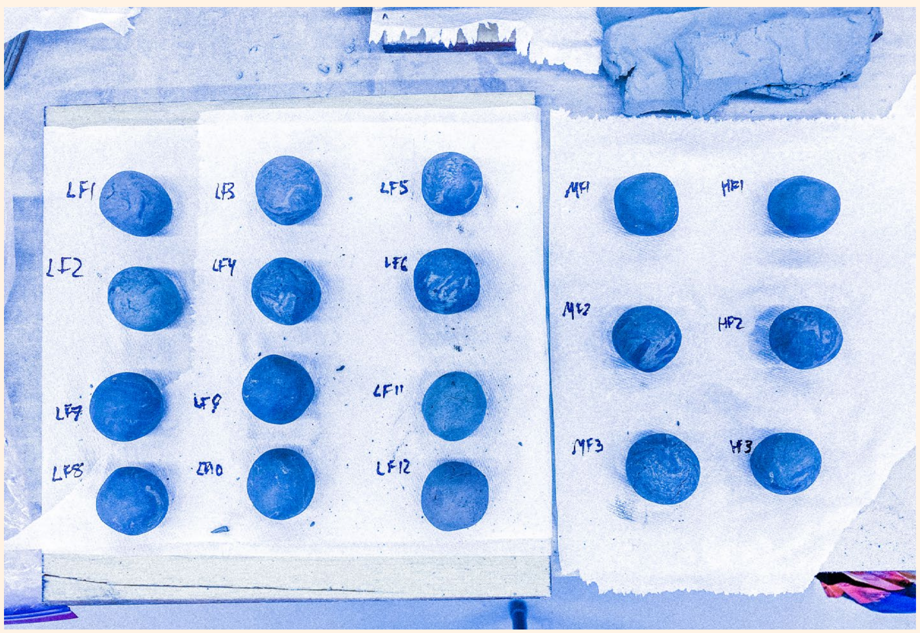
2.4 The dried clay pinch-pots, varying in color based on their composition



2.5 The pinch-pots after bisque firing

A pinch pot is one of the most basic techniques of hand-building. Each clay-body began as a rounded ball and is hand formed into a pot measuring about 3" - 4" in diameter. By forming it into this shape, there is less of a chance of air entrapment, which could cause an explosion. Additionally, it allows for a study of how the clay will self-support itself structurally. The pots were then labeled by etching a code onto its back. All pots will first be fired at low-fire temperatures (1850°F) in the electric kiln, and three of those will be re-fired at medium-high temperatures (2200°F).

2.6 Proportions of clay used in mixture



2.7 Mixed clay

KEY:
CBC: CHIMNEY BLUFF CLAY (WETTEST)
TCC: TERRACOTTA CLAY (MOIST)
GWC: STONE WARE CLAY (DRIEST)

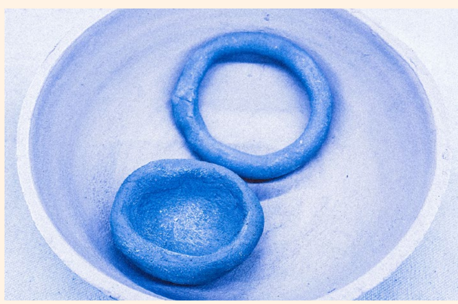
LOW-FIRE:
LF 1: 1/4 CBC + 3/4 TCC
LF 2: 1/4 CBC + 3/4 SWC
LF 3: 1/3 CBC + 2/3 TCC
LF 4: 1/3 CBC + 2/3 SWC
LF 5: 1/2 CBC + 1/2 TCC
LF 6: 1/2 CBC + 1/2 SWC
LF 7: 2/3 CBC + 1/3 SWC
LF 8: 2/3 CBC + 1/3 TCC
LF 9: 3/4 CBC + 1/4 SWC
LF 10: 3/4 CBC + 1/4 TCC
LF 11: 100% SWC
LF 12: 100% TCC

MEDIUM FIRE:
MF 1: 100% CBC
MF 2: 1/2 CBC + 1/2 TCC
MF 3: 1/2 CBC + 1/2 SWC

HIGH FIRE:
HF 1: 100% CBC
HF 2: 1/2 CBC + 1/2 TCC
HF 3: 1/2 CBC + 1/2 SWC

After firing, there were several noticeable changes to the material's properties. The most profound was the change in color. It also became clear which pots contained more of the clay-body as they turned out lighter. In comparison, the pots that were heavier in sourced clay were redder, likely due to increased presence of natural metals. All of the pots were significantly lighter due to the absence of water.

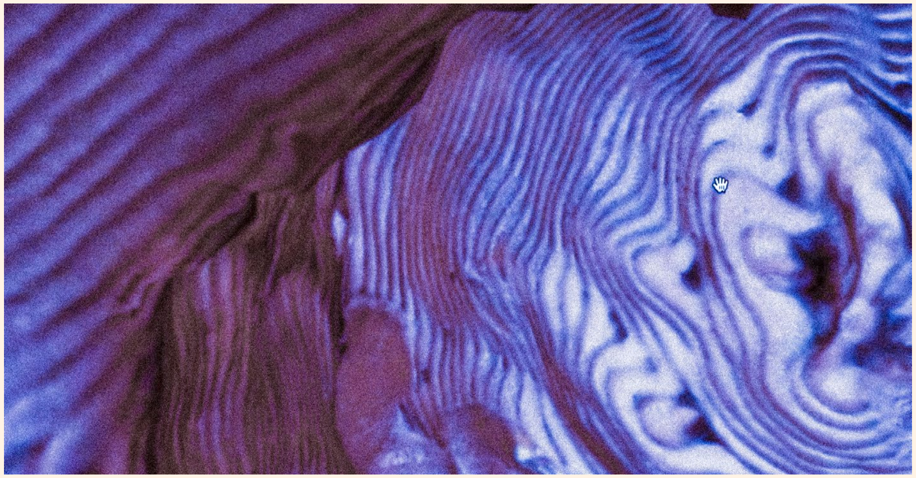
Once the three medium-fire pots were re-fired, they turned into a much darker brown color and started to show significant cracking and bubbling. The pot with the most clay-body out of the three (MF3) was the only one that did not stick to the ceramic shelf. Pot MF2 retained its shape but became bonded to the shelf, whereas the pure sourced clay (MF1) did not survive the re-firing process and melted completely onto the shelf.



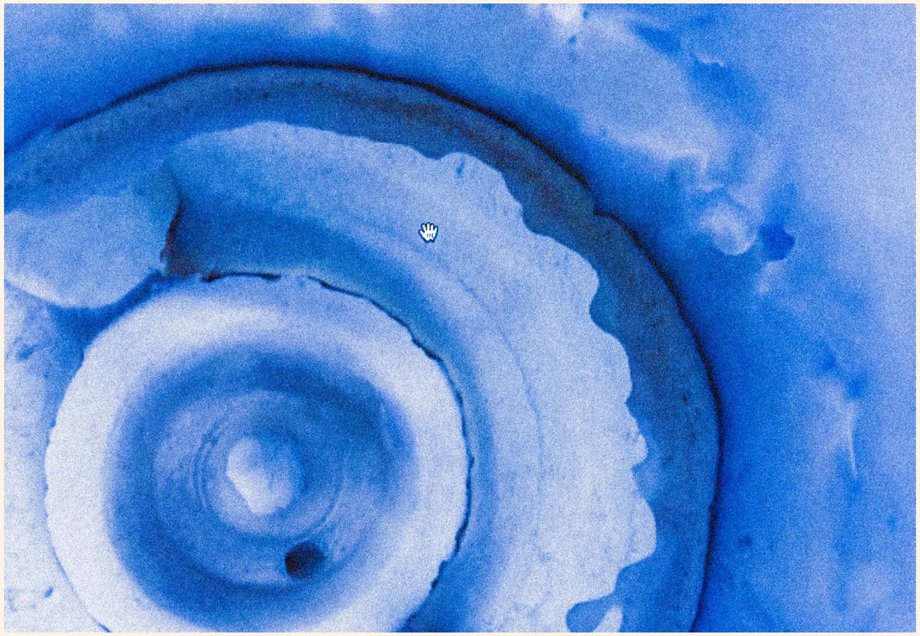
2.8 Simple pinch-pot and coil test

2.9 Medium-high firing of pinch pots resulting in a melted pot

The next set of tests were a series of photogrammetry techniques involving a conventional camera or phone camera, in unison with 3D model stitching software such as Metashape. The premise of the tests was to understand the effects of texture, color, lighting and positioning on the quality of the resulting 3D object.

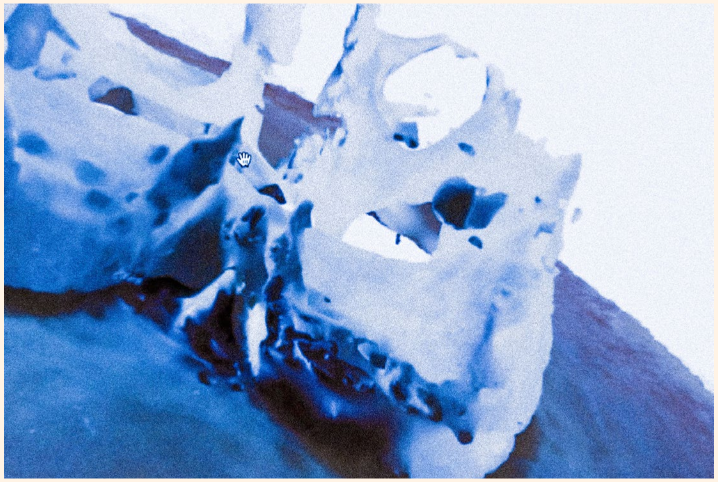


2.10 Inside-out view of a scanned 3D ceramic-printed object



2.11 Inside-out view of a scanned ceramic pot

2.12 Detail view of a scanned hand-built ceramic mug



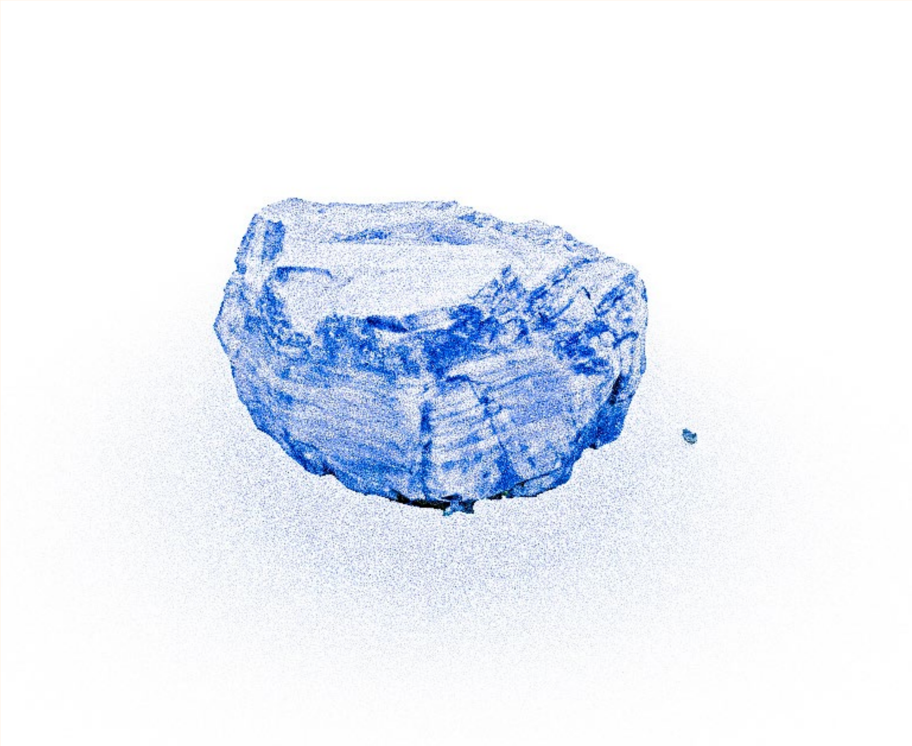
2.13 View of a failed scan of "dwelling"

A selection of ceramic objects were used according to different techniques. Two hand-built objects were picked, one with a smooth finish, the other with considerable texture and ridges. A wheel-thrown vessel and a ceramic 3D printed sculpture were also included. Each object was selected from a different stage of the clay process. One was a wet ceramic object, another two were dried (greenware) and one was fully fired.

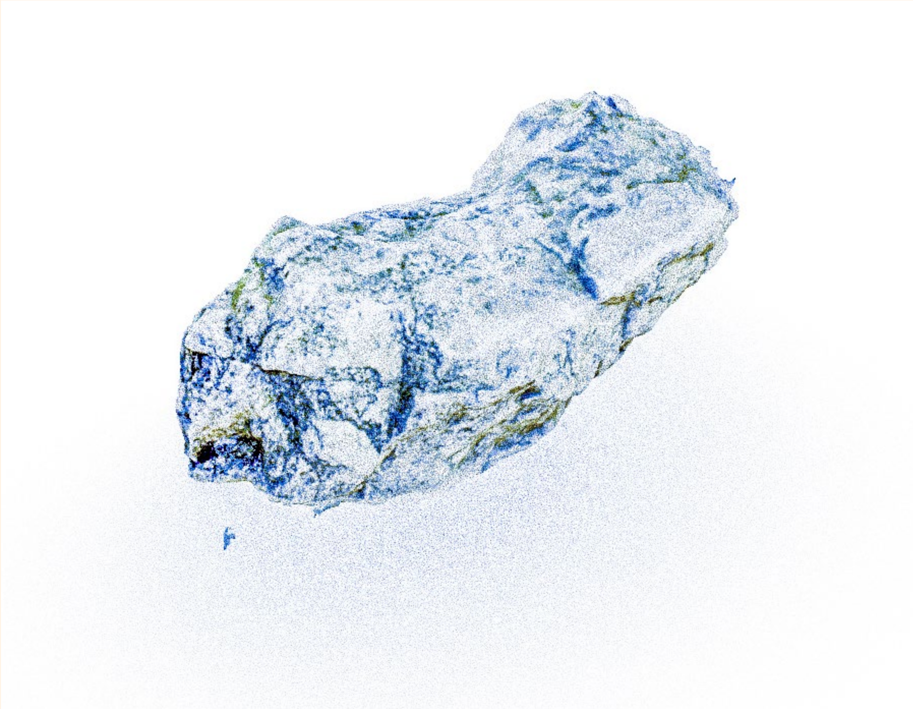
These tests found that smooth and reflective (wet) surfaces were the least compatible with the scanning process and caused glitching and odd shapes to occur.

When an object is scanned, the number of photos used will affect the quality and level of detail too. Smaller objects generally require less captures to receive adequate detail. Interestingly, during the digitization process, there is a loss of scale that occurs. Objects can easily be scaled up or down, and the detail respectively. This phenomenon is apparent in the images at right. The blue rock is significantly larger than the brown one. On the page, they appear nearly identical. In the image with the blue rock however, the brown rock (to scale) is seen to its bottom right.

The next test sought to take a physical found object and convert it into a digital mold. A rock sourced from the abandoned quarry at Skytop was used.

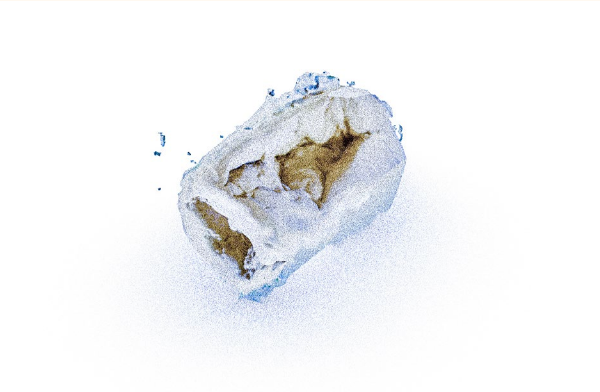


2.14 Scanned large quarry rock next to the small rock (opposite page) to scale

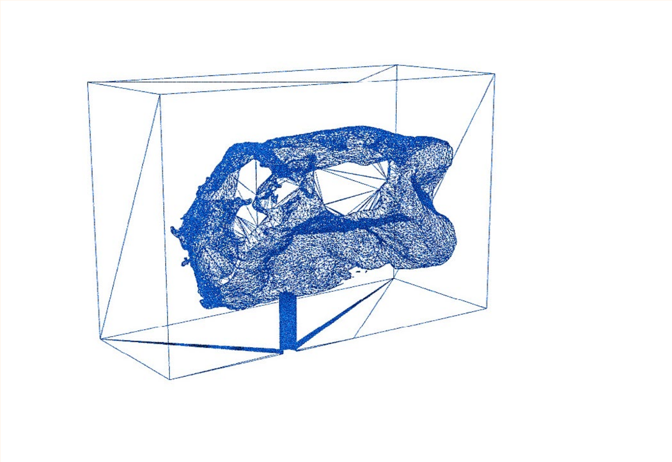


2.15 Scanned small quarry rock

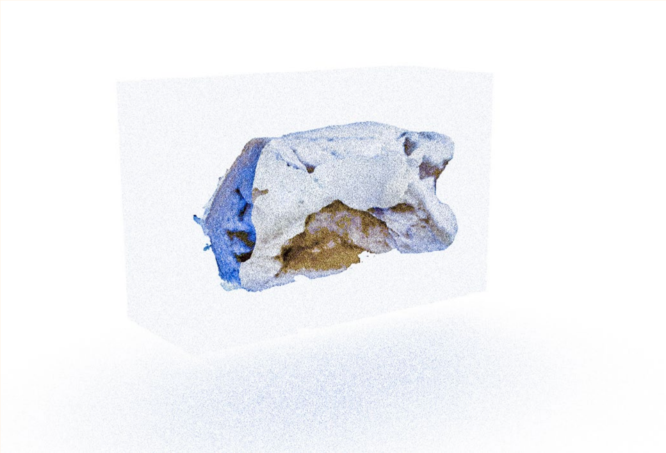
2.16 Original found object



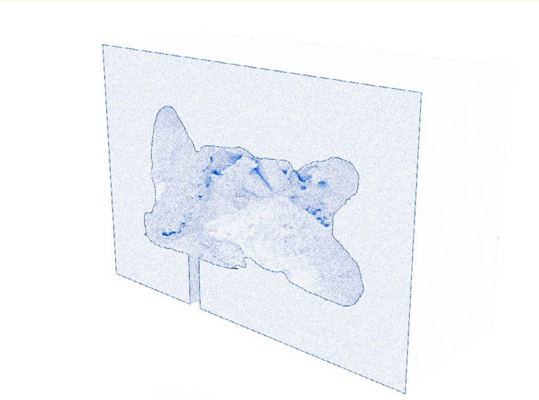
2.17 Object imprinted into clay block



2.18 Object scanned and imported into Rhino



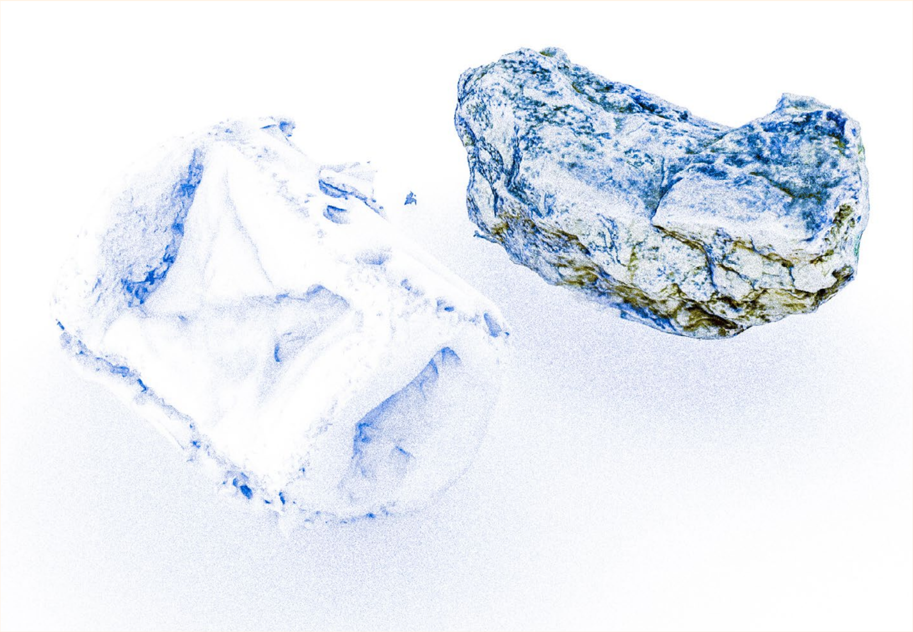
2.19 Digital section mold in Rhino



2.20 Completed mold representation

2.21 Digital "slip-cast" from digital mold

A cyclical "pipeline" was developed to convert this found object to a digital one, which could then be re-created using mold-making to produce a new physical artifact that is a distant relative of the original one.



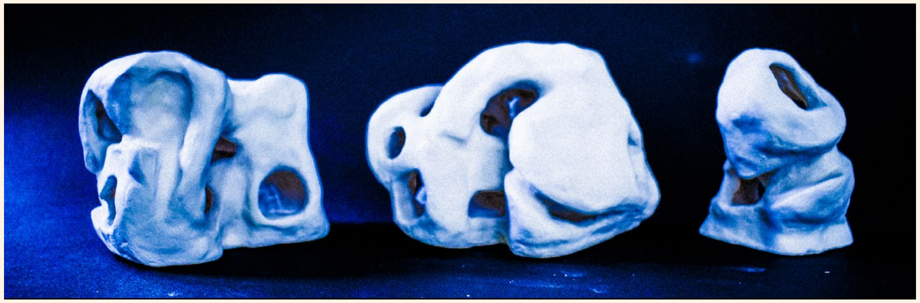
2.22 Resulting digital artefact next to the original scanned object

Once the object is sourced, it is imprinted in a block of clay. This "imprint" is then scanned into the photogrammetry software to produce a digital object. The object is then spliced and inserted into a digital mold which captures its form. The mold can then be produced through digital fabrication processes such as 3D printing or CNC milling. The completed mold can then be cast to produce a new physical object.

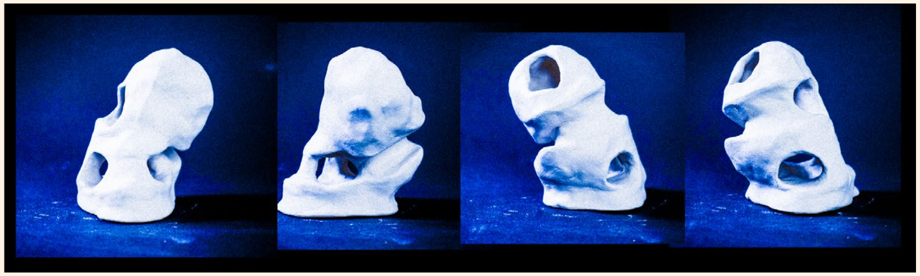
The resulting artifact is both an imprint and a defamiliarization of the matter it originally represented. Further, this object can once again be plugged into the pipeline to further be altered by both the physical and digital making processes.

Physically, the deterioration of the mold, lighting during scanning and other errors will affect the product. Digitally, software assumptions, de-resolution and triangulation will also affect the object. Additionally, in this case, holes required for hollowing the object to be 3D printed on the powder printer also altered the final form of the created artifact.

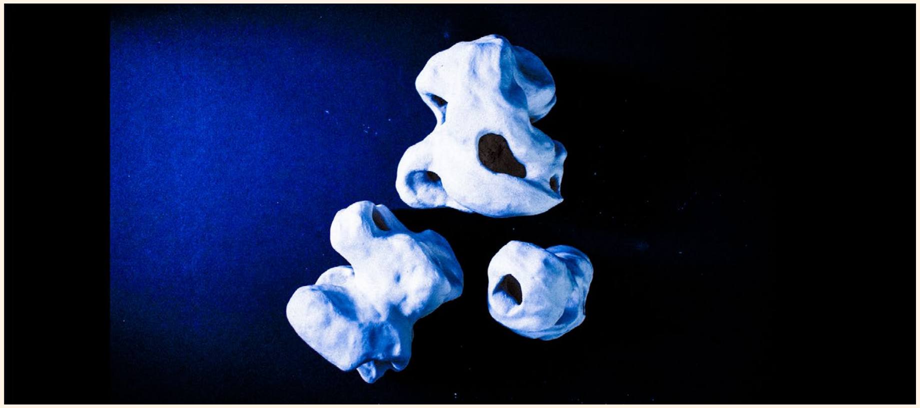
2.23 Different views of digital artefact



2.24 The three "dwellings"

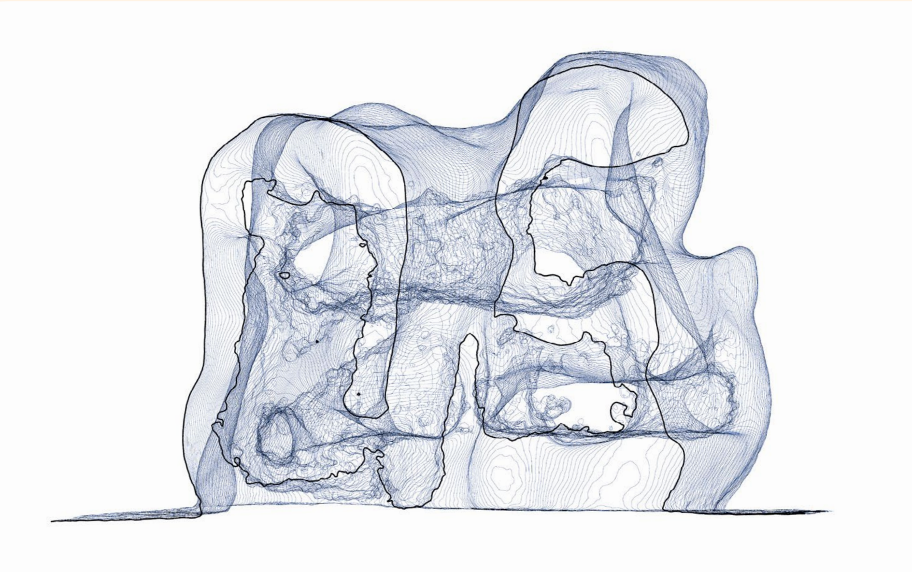


2.25 Different views of the little "dwelling"

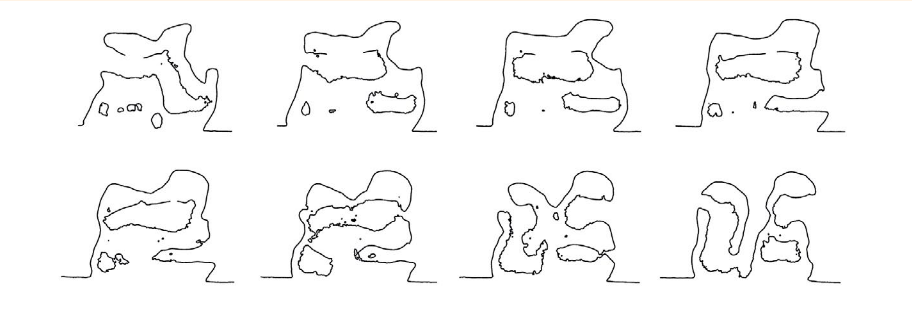


2.26 Overhead view of the three "dwellings"

This series of "dwellings" is an abstracted representation of human interventions within the lithosphere to create domestic space. These objects were created as a formal study to continue to experiment with photogrammetry and the effect of a "loss of thickness" during the digitization process. After scanning, these objects were digitally spliced to reveal the assumptions of the software of the interior spaces that could not be scanned externally. The result is a series of fine-line interior sections that are somewhere between physical reality and the false reality of digitization.



2.27 Sectional views of the scanned "dwelling"



2.28 Section cuts at various depths of the scanned "dwelling"

The final portion of this exercise concerns indexing, in that it attempts to identify processes and change by the juxtaposition of the typical conditions identified by these studies. By indexing these typologies, a comparison can be made of the residual, or existing traces of the non-existent. The project attempts to be critical of what is produced through its studies, while attempting to assign meaning to the artifacts at each step of their production process.

There is a focus on embedding and documenting. As wet-matter becomes wetter or drier, the process attempts to capture "snap-shots" at significant points of the process. These captures can once again be both physical and digital. Physically, the mold-making process literally imprints traces of the objects and preserves it. Digitally, the scanning process can begin to track changes in great detail.

The ultimate goal is to expose the realities of wet-matter: to understand what is there. As with sediment layers within the lithosphere, there is an investigation of the lines of the object or place that registers time through the study of residue.

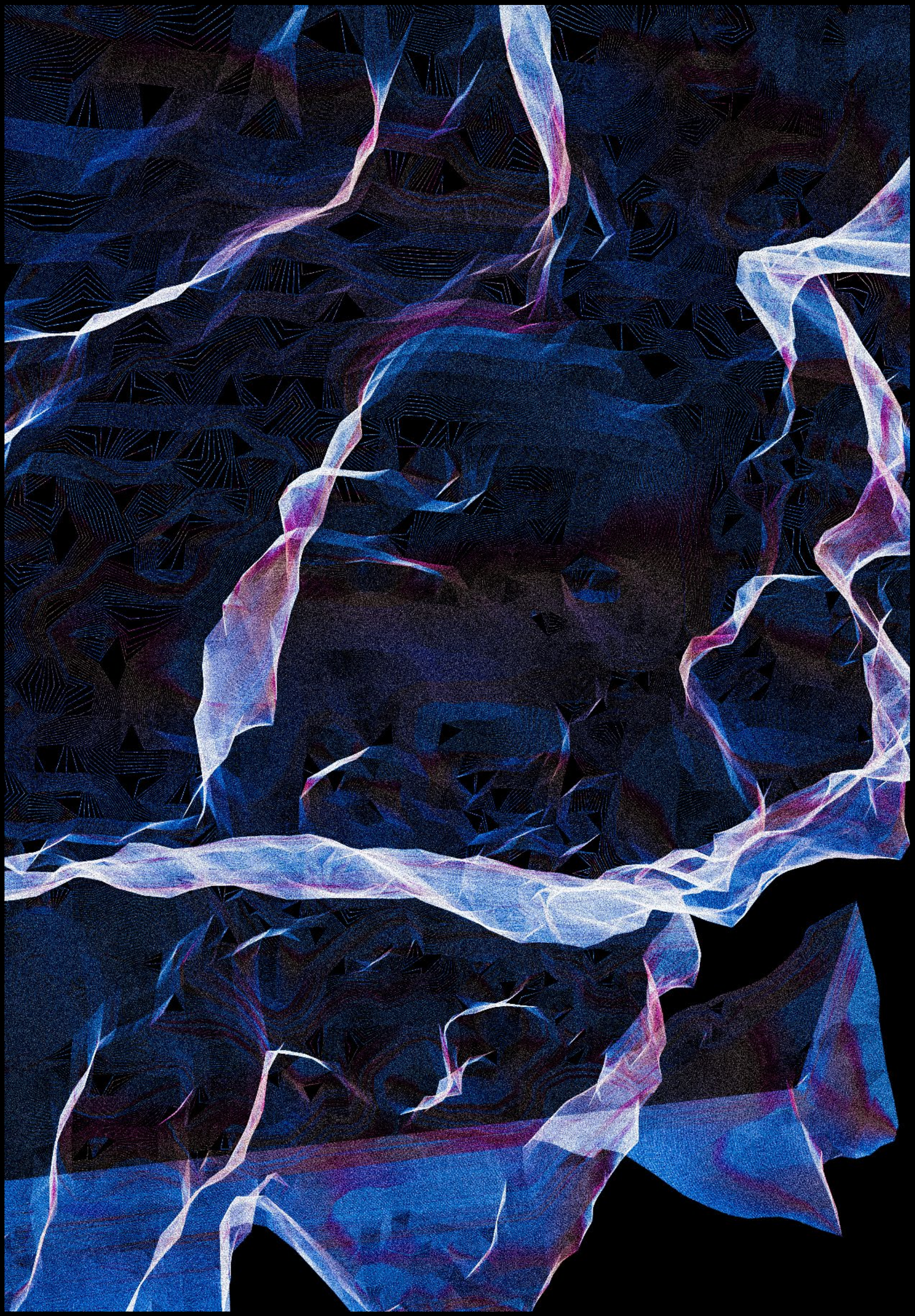
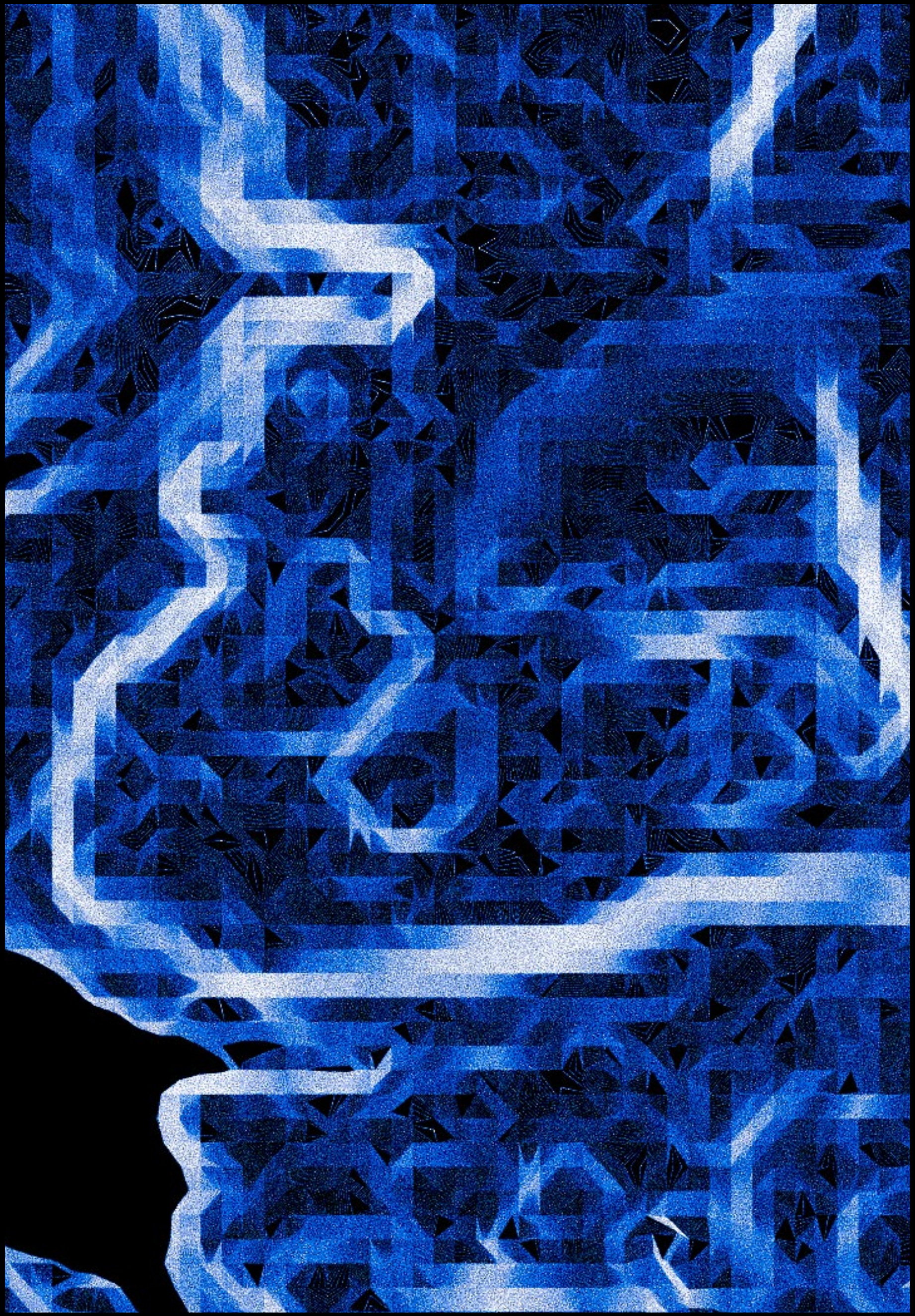
A dam typology was selected. The project is less interested in the dam itself, but rather the adjacent environment. A major hydrological displacement leaves the pre-damed area (impoundment) flooded and the post-dam (outlet) area deprived of water, resulting in an abundance of post-wet-matter at its banks. These are the areas where residue is most prevalent and best registered. To accomplish the registration process, a slip-casting protocol will be employed.

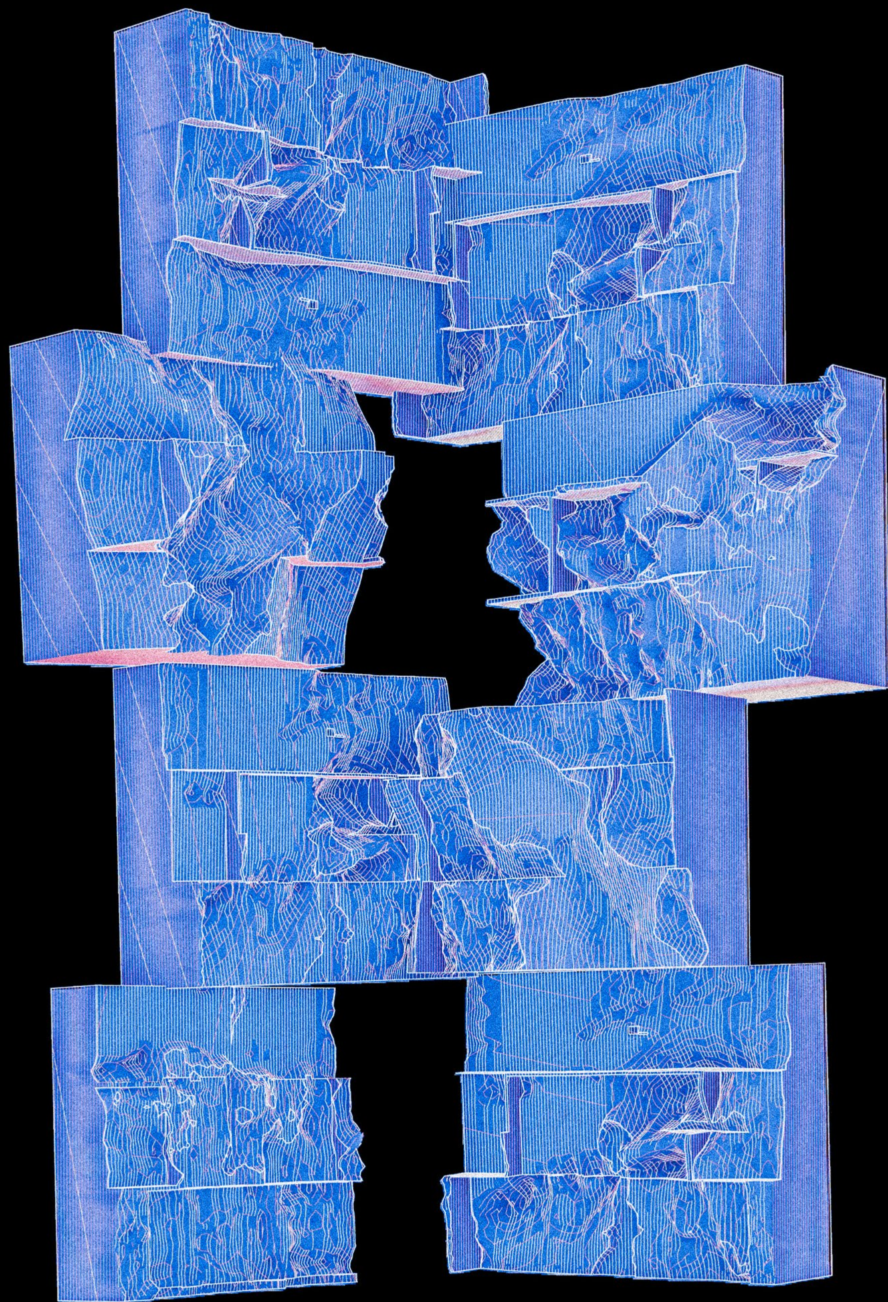
This process is similar to the primary cyclical process of the testing phase, in that it involves a series of molds, or "negatives" that are inverted several times. The potential for mass production through these mold-forming means allows for an iterative process that can deal with different variables including the type of clay used, its source, the slip saturation, color and firing temperature.

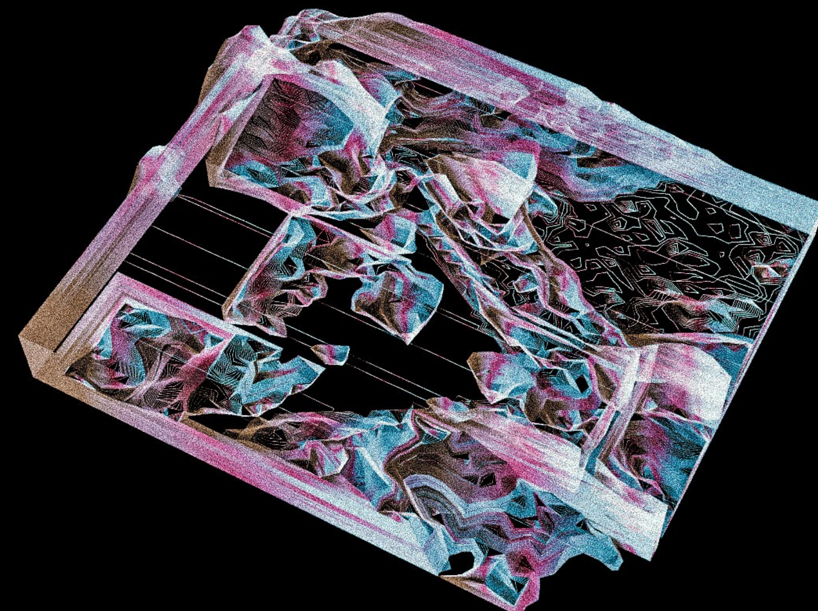
Additionally, each time a mold is used, it deteriorates and results in a de-resolution of the artifact, further altering each iteration. Triangulation and pixelation occur at the digital stages of the process. The bit's line from the CNC mill, for example, will be transcribed over into the final object, as will other smudges as a memory of the process

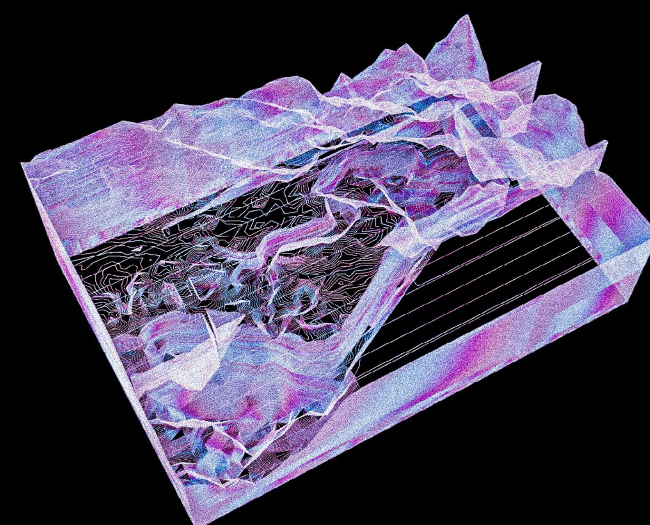
The intention is to create a series of these artifacts, to embed these mishaps and to exaggerate to achieve desired outcomes. The seams themselves become an actual quality, as their exaggeration by the slip seepage during casting helps delineate the individual objects while simultaneously morphing them

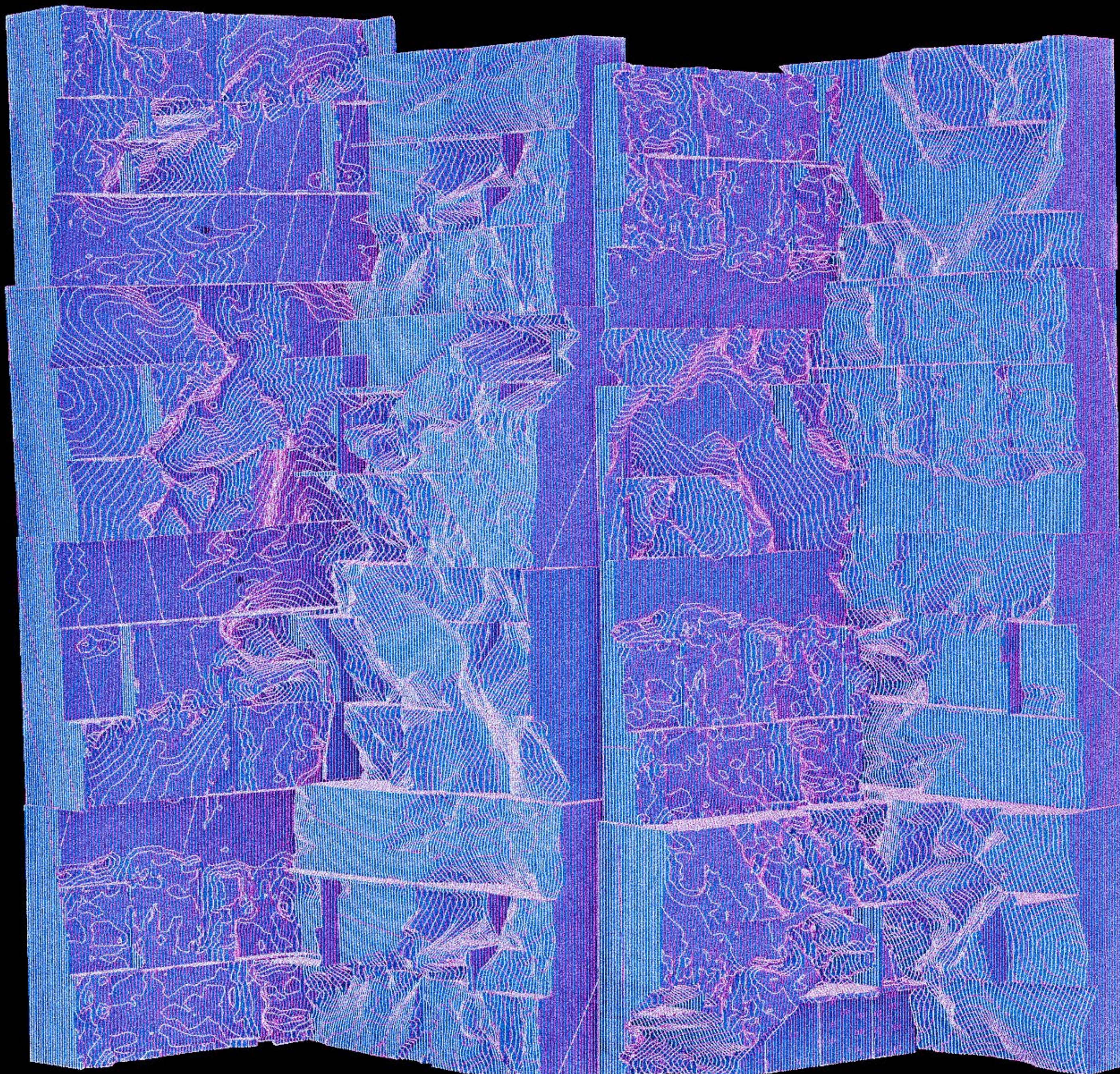
These objects can then be arranged into a vertical assembly, creating a fictional landscape, affected by both terrestrial and digital erosion processes, which juxtaposes the conditions of lithospheric interventions and conditions. This collaging of residue can help expose the realities of what is in the terrain, out of which new manifestations of wet matter can arise.

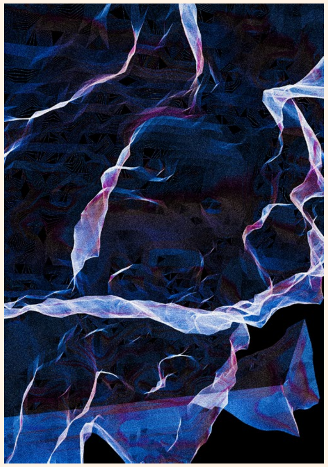




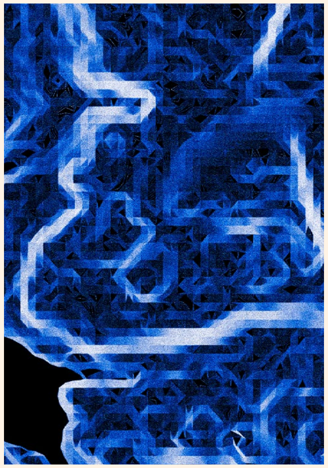




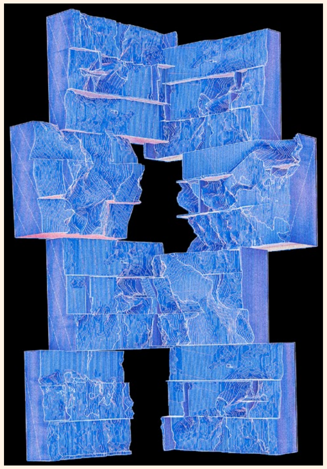
2.29 Perspective view of contours produced from digital landscape collage

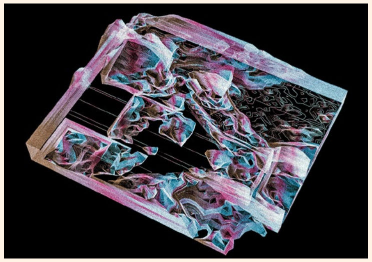


2.30 Top plan view of contours produced from digital landscape collage

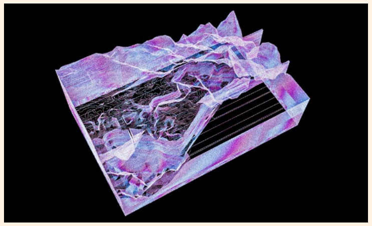


2.31 Proposed installation of landscape collages

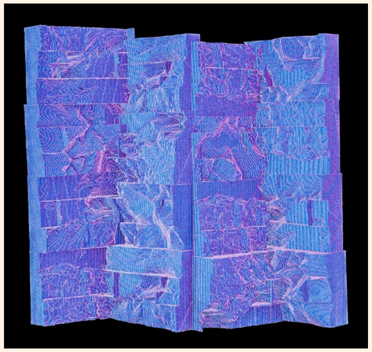




2.32 Contour chunk of digital landscape collage



2.33 Contour chunk of digital landscape collage



2.34 Alternative proposed installation of landscape collages

INTERVENTION

in•ter•ven•tion

1. the act of interfering with the outcome or course especially of a condition or process
2. to occur, fall or come between points of time or events
3. to come in or between by the way of hindrance or modification

Critical Statement

In the Spring of 2018, I had the opportunity to produce and record an interview with then School of Architecture Harry der Boghosian Fellow, Linda Zhang. At the time Zhang was preparing to launch her Beta-Real Exhibition in the School of Architecture's marble room. The exhibit would be the culmination of work from her studios that year, which all focused on the slip-casting methodology. Through that interview I learned more about Zhang's aspirations and creative process. I didn't know it at the time, but this interview planted a seed in my mind that would eventually lead to the initial development of this project. What particularly struck me through learning more about Zhang's project, as well as her subsequent ones, was the way they engaged interdisciplinary voices, research methods and re-thought traditional craft.

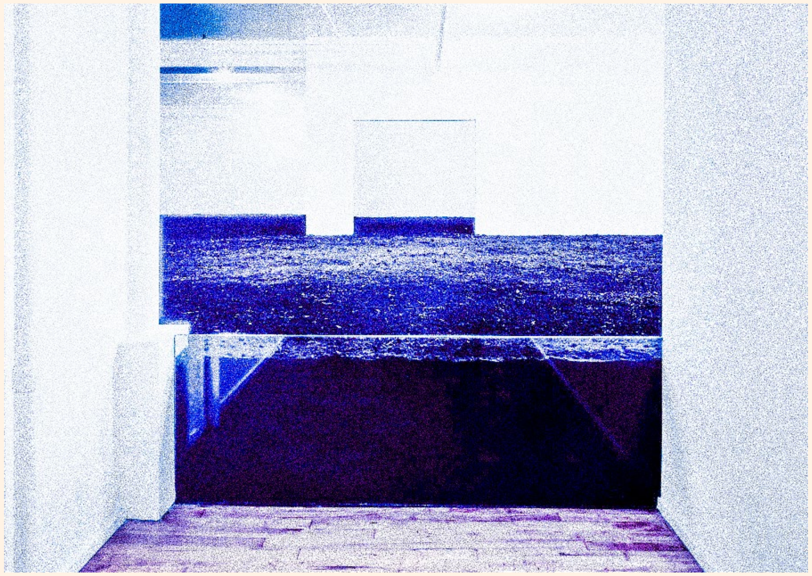
When I first began to engage the project and seek out advice the semester before I began my thesis work, I connected with Errol Willett, a ceramics professor at the School of Visual and Performing Arts. I expressed my interest in designing a thesis that was highly engaged with both architectural and ceramic mediums and the role of technology. I was very warmly received, and Willett offered me a tour of the Comstock Art Facility, which featured a 12,500 square-foot ceramics facility. Willett sat down with me after the tour and told me about his own collaborative project, Haptek Lab, which engages a series of interdisciplinary faculty across the US and Canada (including Linda Zhang). The design-research group primarily utilizes an industrial robotic arm to explore new possibilities for ceramic production, while "rejecting the disconnect between digital fabrication and haptic qualities of material behavior." As I began exploring all of the recent technological possibilities of working with clay, I came across incredible projects involving ceramic 3D printers, mills, robots, photogrammetry and more. One common aspect among most of these, I found, was that all of the projects sought to "celebrate" material behavior, instead of trying to control it. I settled on slip-casting because I was particularly excited about the idea of mass production, and the way molds "carried" the various mishaps and stages of the process with them into the final product. I wanted my thesis to likewise index and visualize the various processes and how they affect an outcome.

To start working towards these goals, I signed up for a hand-building ceramics course with professor Margie Hughto in my penultimate semester. In that course, I practiced the most fundamental techniques such as coil-making, slabs and carving. During this time I began engaging the various faculty around the ceramics department at ComArt. Hughto insisted I reach out to Britt Thorp, a third-year graduate student at the University, who also taught an introductory slip-casting course. Although I was unable to enroll in his class that semester due to a schedule conflict, I would frequent his studio-office and pick his brain for inspiration and artists who worked with the slip-casting process. I enrolled in his course the following semester, where I worked with Thorp to develop most of the methods employed in this thesis. Simultaneously, I was reading a lot about the role of architects on transforming territory and the ecological consequences of built work. A course I was taking with Doctor Becca Farnum at the time, entitled Climates of Resistance: Environmental Racism and Collective Action, involved a lot of discussion about agency and the impact of humans on the earth's ecology. Unsurprisingly, the course also focused a lot on the role of water as resource, with two guests visiting the class virtually to discuss their projects. Emma Robbins, a Diné artist, activist and community organizer, discussed her role as the director of the Navajo Water Project, which brings clean running water to Navajo families. Similarly, Jamila Bargach, co-founder of Dar Si Hmad, running the world's largest operational fog harvesting project, spoke to us about the innovative technology to deliver potable water to Amazigh households by condensing fog. Clay, of course, is deeply connected to water and could act as a simulator for some of the ecological shifts I was studying, a sort of registrant of the phenomena acting upon it.

In working with the physical-to-digital-to-physical pipeline, I found that the discrepancies between the conversion process to one medium from another were the most interesting parts - but also the most annoying. The awful resolution of the mill, the messiness of plaster and the fragility of the un-fired clay were all obstacles to the process, but also ended up informing most of the design decisions I was making. Thorp offered a suggestion to mass produce plaster molds quickly using a silicone rubber "mother" mold technique, which – one frantic trip to Allentown, Pennsylvania and a curing scare later – ended up working beautifully. Allowing the materials to make the decisions for me allowed for a systematic feedback loop, which I found to be an incredibly productive way to index and design.

Precedent Studies

Walter De Maria's "The New York Earth Room," is the third such iteration executed by the artist. The first being in Munich Germany and the second in Darmstadt, Germany. The sculpture contains 250 cubic years of earth and covers 3,600 square feet of floor space with 22 inches of material. The exhibit has been open long-term to the public since 1977.



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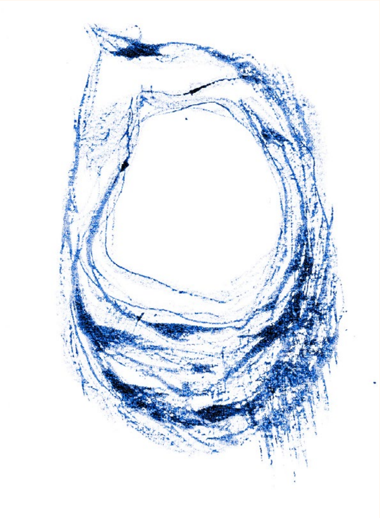

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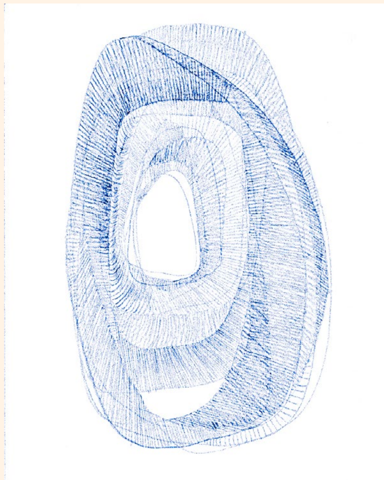

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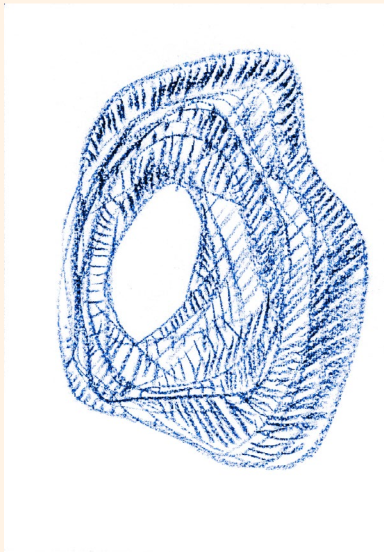


3.4

Miguel Guitart's "Caves" explores the condition of the opening, taking the experience from darkness to a new light. These pieces are inspired by Plato's Metaphor of the Cave, and the meaning of life in relation to knowledge and the search for intellectual perfection.

3.5

Olafur Eliasson's "Life" attempts to create a space of coexistence among those involved in and affected by the exhibit. Visitors find their way through the exhibition along dark wooden walkways, accompanied by the ambient sounds of insects, traffic and other people, as well as the smells of the plants and water. For the exhibition, the facade's windows were removed to allow visitors entry day and night. In the dark, the water fluoresces due to the effect of ultraviolet light on uranine dye in the water. The water fills the space, connecting the interior with the outdoor pond to create a continuous waterscape.

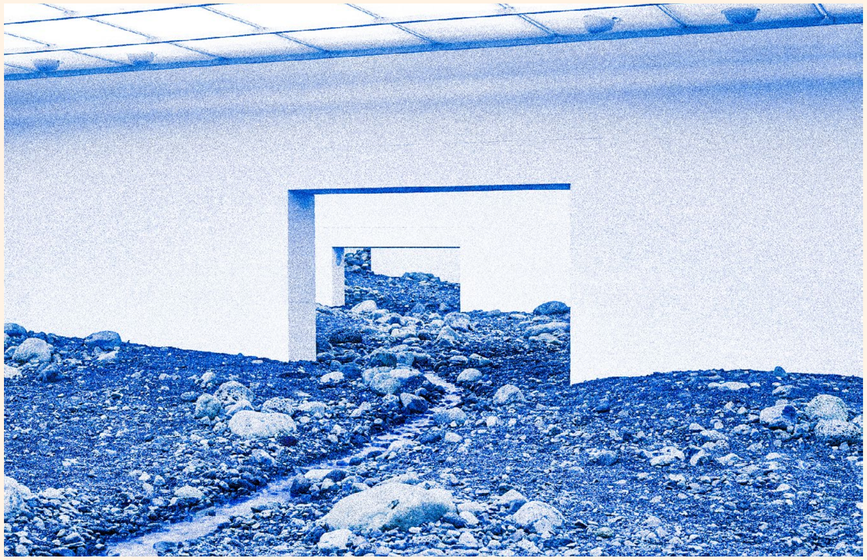
3.6

3.7

3.8

Olafur Eliasson's "Your Waste of Time" takes several blocks of ice from Vatnajökull, the largest glacier in Iceland, and places them in a Berlin gallery, where they were exhibited in a refrigerated space. The project considers the role of time and its relativity: from the vastness of geological time, to the nanosecond of the glacier's existence in a gallery space.

Olafur Eliasson's "Riverbed," attempts to blur the boundaries between the natural world and the man-made by recreating an enormous rocky landscape at the Louisiana Museum of Modern Art. The exhibition also questions the meaning and experience of the museum itself, as well as the complexities of the relationship between the artist, building and viewer. The installation is primarily comprised of Icelandic rocks, and complete with a flowing river.



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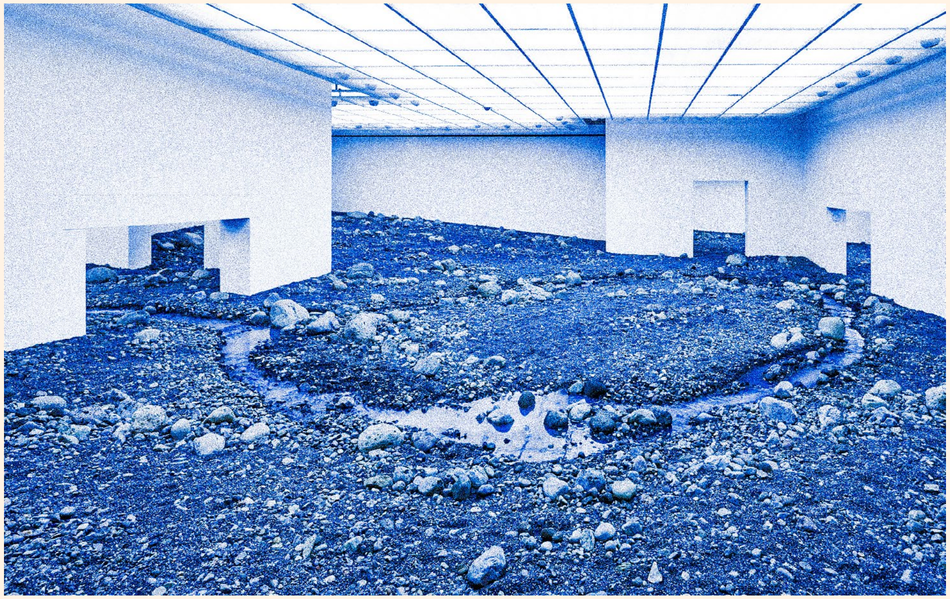

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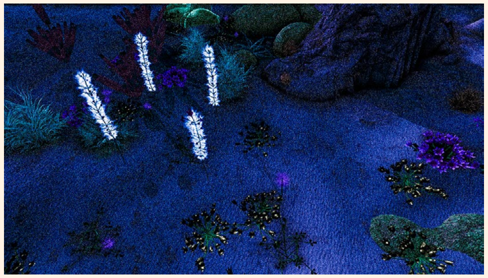


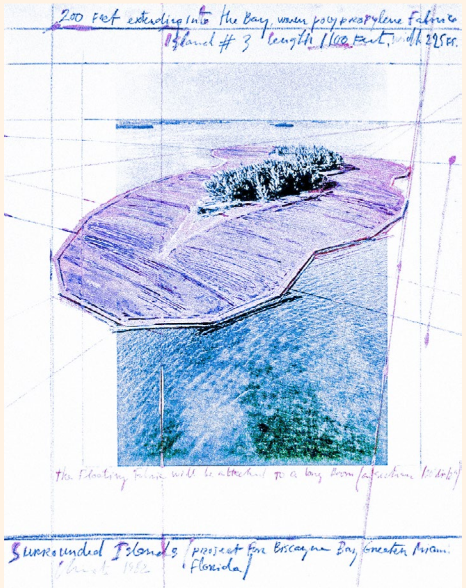
3.13

Alexandra Daisy Ginsberg's "The Wilding of Mars" considers the landscape of Mars, seen as untouched by Earth life and therefore barren, treacherous, beautiful; another planet to colonize. The project imagines Mars colonized not by exploitive people, but by plants. Simulations of the growth of a planetary wilderness, seeded with Earth life forms aims not to terraform Mars, but instead offer a repository for the mechanism of life. In the installation, multiple simulations run in parallel, as endless possible worlds emerge, challenging the assumption that the outcome of space colonization must be human benefit.

Simon Starling's 'Island for Weeds' is a support structure designed to sustain and contain Rhododendron practicum plants, a rather hearty shrub. The system was originally conceived to float on Loch Lomond, Scotland where this plant has become invasive and an issue for landowners and conversationalists. The system is designed in a way in which it can regulate its own height in the water using compressed air stored in blue pipes and varying amounts of water stored in the yellow ones. It can therefore regulate itself to keep a consistent level using a series of switches and depth gauges.

3.14

Christo and Jeanne Claude's "Surrounded Islands" was installed in Biscayne Bay, between the city of Miami and Miami Beach. The Islands were surrounded with 603,870 square meters of woven pink polypropylene fabric covering the surface of the water for two weeks. The project underlined the various elements and ways in which the people of Miami live, between land and water.



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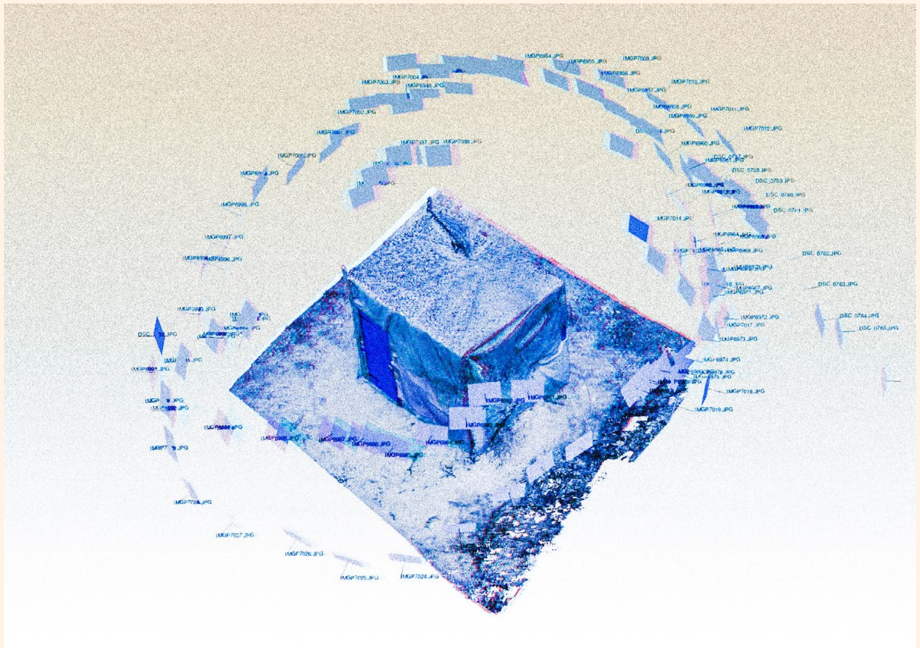
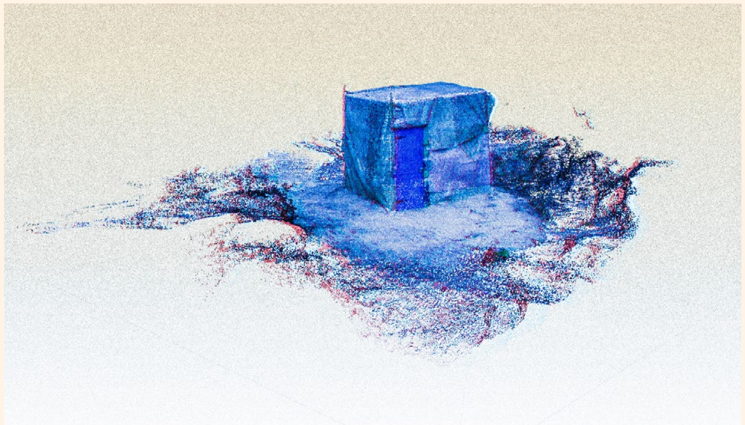


3.17

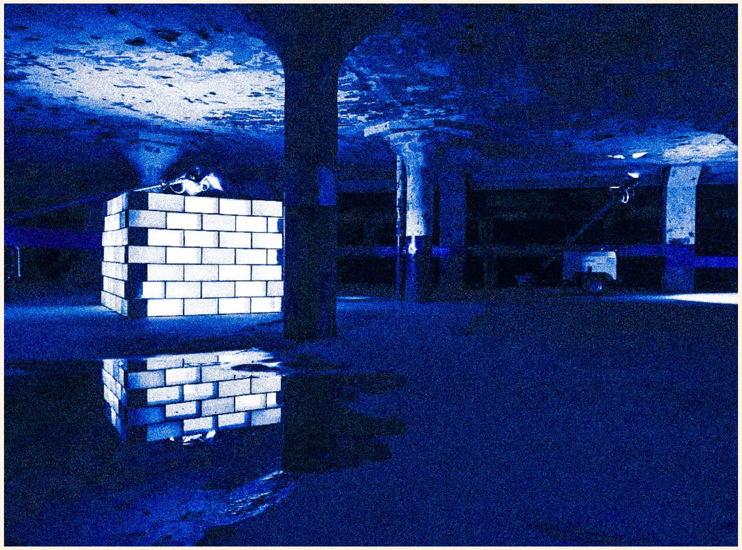
Sam Jacob Studio's "Dar Abu Said" was exhibited at the 2016 Venice Biennale as an architectural document that reports from the shifting yet sharp edge of contemporary architecture. It explores how the 'conservation of the immediate present' can act as a political document. The project involves the 3D scanning of a shelter constructed in the migrant camp at Calais and remakes this scan as a 1:1 replica object within the pavilion.



3.18

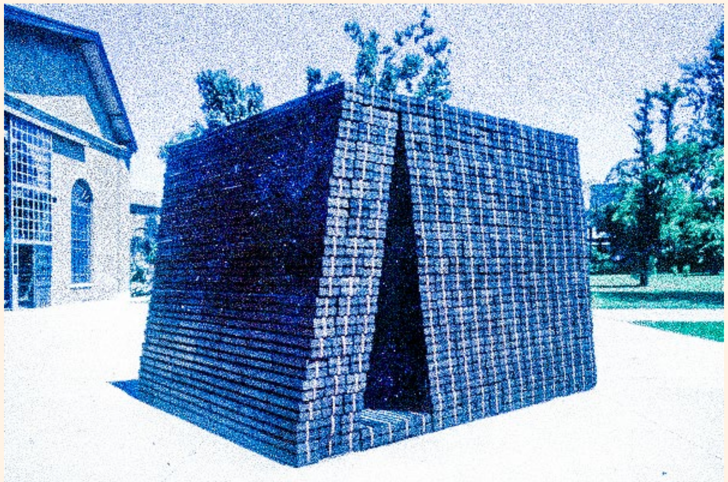
3.19

Miguel Guitart's "Cube of Memory," was a proposal for the Echo Art Fair 2016 consisting of a large cube assembled with wooden frames, paper and light. It recreated a reflection around the qualities of permanence and temporality in the memory of our cities. The paper is torn and moved by the intense winds, while the wood frame stayed still and perfectly aligned.



3.20

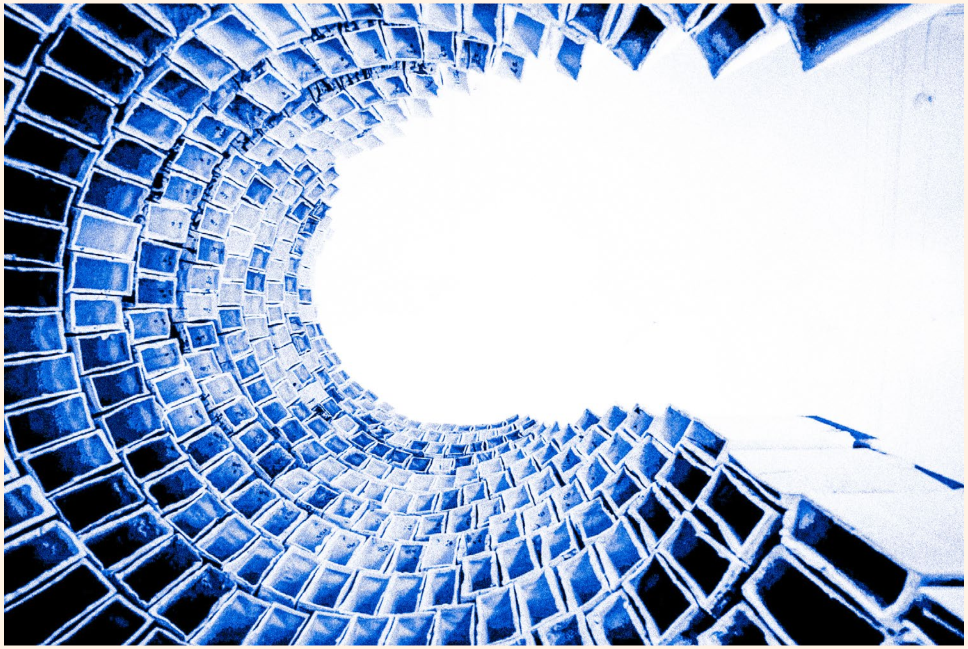
Tom dePaor Architect's Irish Pavilion made for the 2000 Venice Biennale uses bricks of mud from Irish bogs. In Ireland, bogs function as a boundary and a space of reinvention, thus the pavilion is presented as a wet collective entity containing matter exceeding its immediate appearance.



3.21

3.22

Linda Zhang's Beta-Real Exhibition seeks to expose fixed memory, fixed identity and fixed history as nothing more than traces of memories, identities and histories. In place of the Real, the Beta-Real names a beta version still in development, always shifting. The exhibition was the culmination of Zhang's studios as part of the School of Architecture's Boghosian Fellowship in 2018. Slip-casting was used as an iterative "thinking by making" protocol, an alternative to conventional architectural preservation and reconstruction. Specifically, the exhibited work produced architectural memories, identities and histories by focusing on three seemingly banal site-types: roadways, commemorative monuments and the sites of performative rituals.



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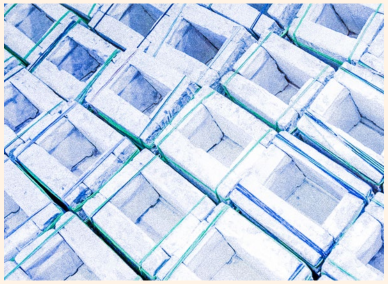

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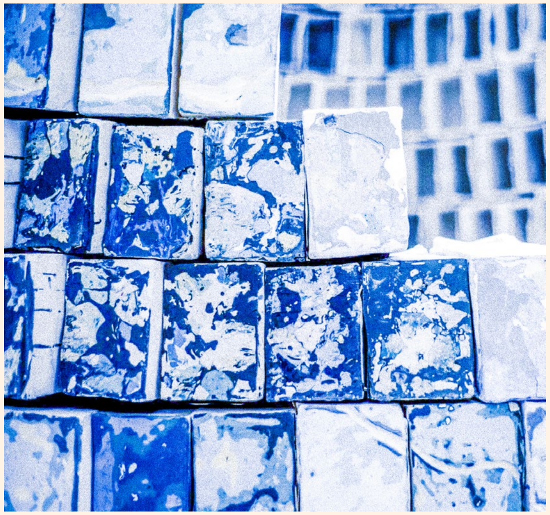

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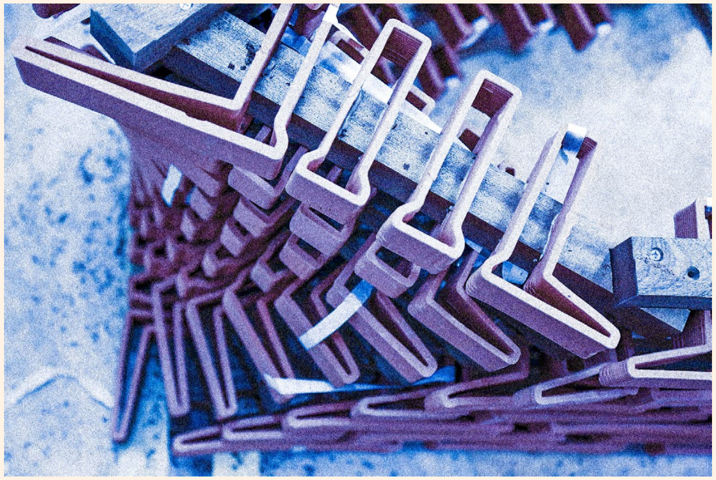
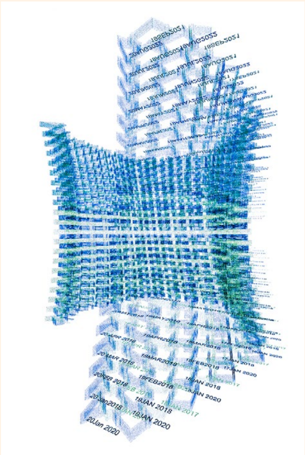


3.27

"CeramicINformation" was created at the Robotic Fabrication Lab at the University of Hong Kong, and is part of an evolving series which aims to reconcile material intelligence of vernacular crafts with the specificity and flexibility promised by digital design and fabrication technologies. Each component was fabricated by a ceramic 3D extruder attached to a robotic arm.



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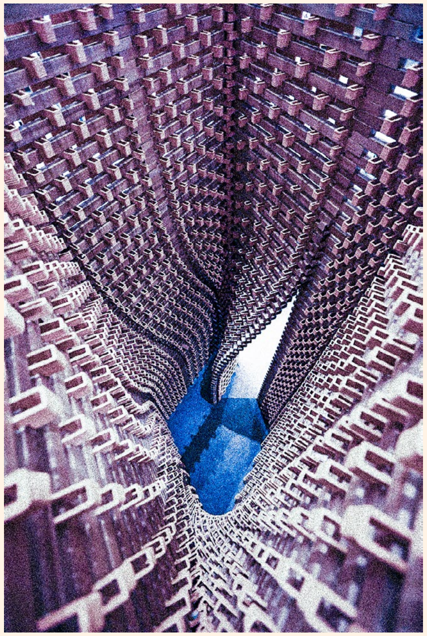

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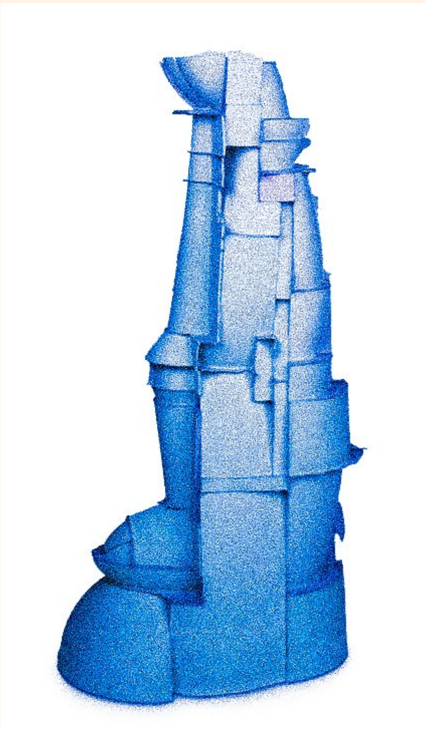
3.31

"Coming World, Remember Me" or CWXRM for short is a collaborative project that involved thousands of people and multiple workshops across the world over nine years to complete. 600,000 ceramic statues represent a person lost in Belgium during the First World War. The pieces are placed at Palingbeek Provincial Park, or "Ypres Salient," which was one of the most fought over pieces of territory in the war.

Kyle John's "Vessel," measures 30 inches in height and is formed by collaging keyless slip-cast molds together. Since the molds are keyless, they can be rearranged in an infinite number of ways, creating one-off forms from one cast to the next. The piece and similar iterations are inspired by the untreated honesty representative of Brutalist design.



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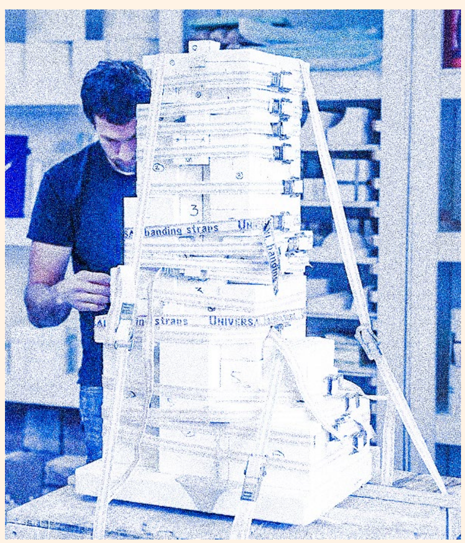
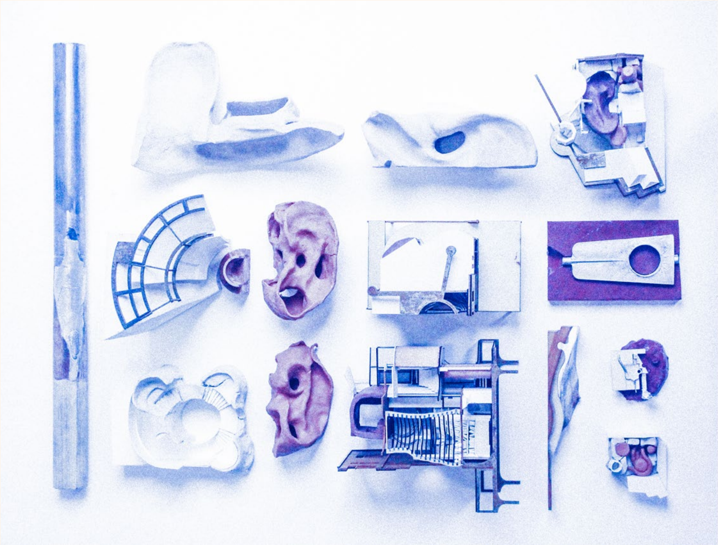


3.33

3.34

Karin Lehmann's "Sediment Sampling" uses 200 unfired pots, which were filled with water and allowed to crack and fall apart into a puddle of formless clay. Unmanaged dematerialization shapes these works as they decay into the floor.



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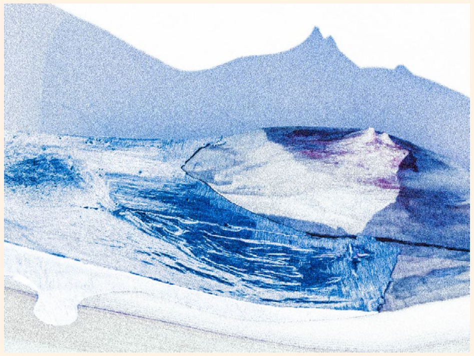
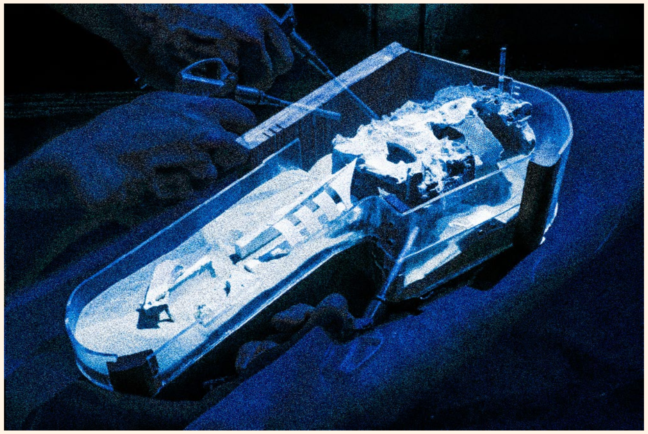


3.37

Felix Sagar's "Object Hallucinations" questions whether the flickering-up and passing-away of consciousness during object perception can be used in architectural design through practicing object-triggered 'free association."

3.38



3.39

Basil Babichev's "Museum of Ancient Recipes" responds to an international amalgamation of culture, seeking to restore a direct relationship between local geography and tradition. Recipes change as they are passed down and forgotten by family generations. The building methodology is erosion, where the walls are cast in layers of brittle concrete, and weathering and human habitation relocates material over centuries, revealing routes and new recipe exhibits.

Deployment

This thesis proposes an intervention in the form of a temporal ecological monument, consisting of an articulated surface of slip-cast "blocks" deployed onto a site. The thesis furthermore proposes two phases for the objects: as a collective assemblage, and as individual indexical artefacts.

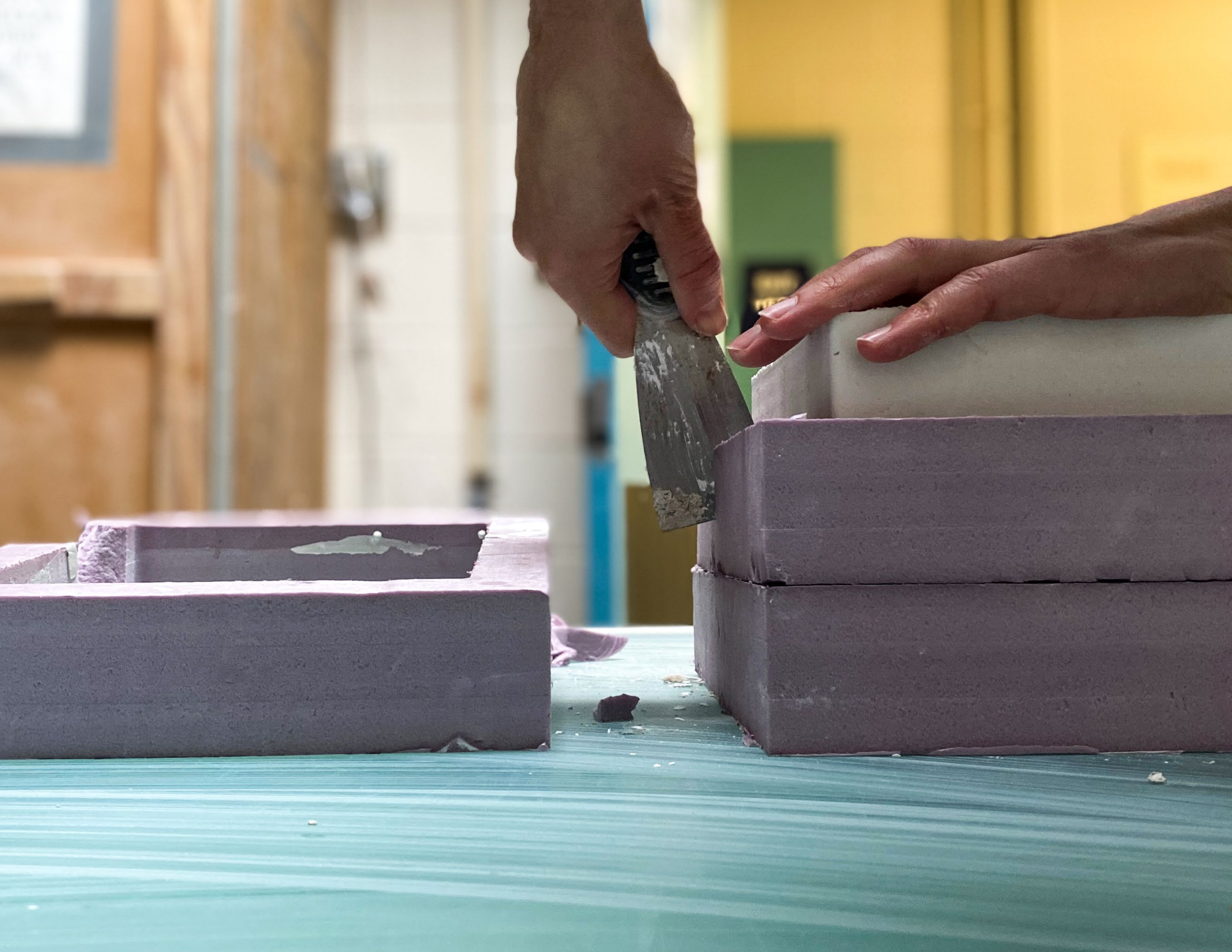
For the first phase, the unfired objects in their most brittle state, are articulated into a vertical surface that is deployed into the earth. They are partially dug into the soil, using the underlying earth, as well as each other for structural support. Their form allows for a degree of flexibility during deployment, as they can be shifted to accommodate for differing slopes on the deployment site.

In an assembly, the objects function as a temporal ecological monument, which can be deployed in sites adjacent to increased human activity that is altering underlying hydrology. At this stage, the ceramic blocks are at their most absorbent, rapidly registering hydrological phenomena, deteriorating where they come into contact with water and marking floodlines with changes in color.
Different phenomena affect the object's decay differently, including factors such as temperature, intensity and humidity. These assemblies can be arranged into a "well" formation that serves as an indexical "cross section" into a site's hydrology. Serving both as a literal indicator of floods, humidity or rain, and as a visual representation of otherwise hidden phenomena. These objects can be left to completely decay back into the earth, or be extracted and fired in a kiln. Firing the deployed objects "seals" the recorded hydrological phenomena, as the block will no longer react to water. In this phase, the blocks become artifactual objects, indexes of the various phenomena that acted upon them - similar to the cycle of their production.

Through 3D scanning, these objects can be digitally archived, or physically exhibited and distributed or sold. In any case - they become artifactual pieces of evidence for intervention in the landscape.


ADMITTANCE OUTSIDE OF CLASS TIME BY RESERVATION ONLY
NO EXCEPTIONS
PLEASE KEEP DOOR CLOSED AT ALL TIMES
PLASTER SINK!


TERRA DISPOSITIONS



4.1 Section view of deployment

4.2 Assembly, Alec's legs for scale

4.3 Releasing the plaster mold

4.4 Slip-cast blocks on cart, awaiting deployment

4.5 Assembly in progress

4.6 Rear view of deployment

4.7 Detail view of deployment

4.8 Slip-cast block pass-off

4.9 Releasing the plaster mold

4.10 Light excavation at the site

4.11 Deployment site

4.12 Deployment nearing completion

ALTERATION

al•ter•a•tion

1. to become different
2. to make different without changing into something else
3. a mineral that has been altered by a chemical process

Process

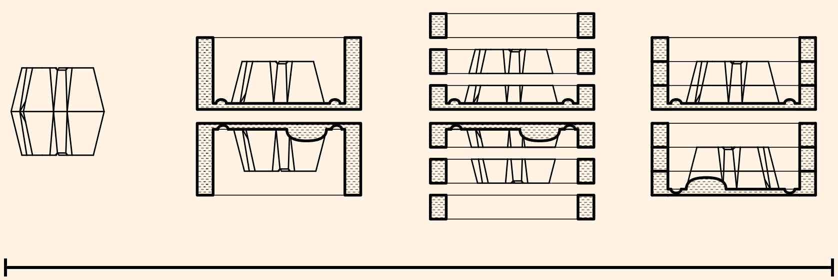
The process presented here is the result of many rounds of prototyping, experimenting and refining. The objects were originally tested in a smaller, scaled prototype block, then scaled up into a refined form based on the data collected. The process was developed to maximize speed and strength, while also conserving materials and limiting costs.

The process consists of a series of mold positives, negatives and double negatives. Each time a mold is produced, the object is imprinted into the resulting mold. This means any material mishaps including cracks, tears, seams, air bubbles or others become permanently indexed into the mold, and are carried on throughout the process.

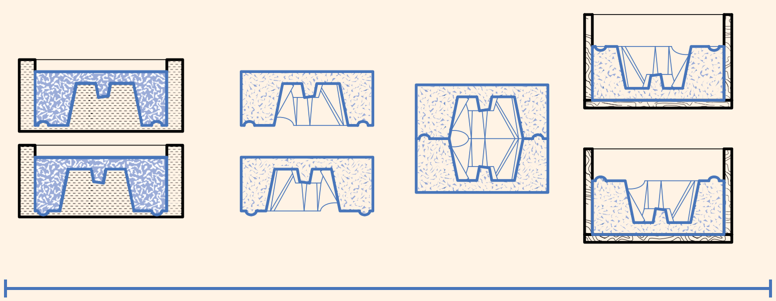
The resulting object carries the information given to it by each step, becoming an index of the materials involved and steps taken.

Mold-Making

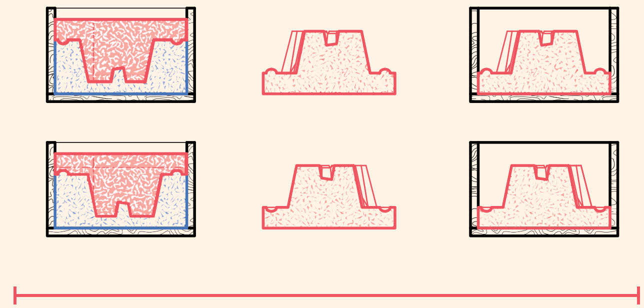
The mold-making process involves a number of inversions. Therefore, it is easiest to understand this process of positives, negatives and double positives sectionally. The following diagram is representative of the five main processes employed in this thesis: digital fabrication, plaster mold production, master mold production, mass production of the plaster molds and slip-casting.



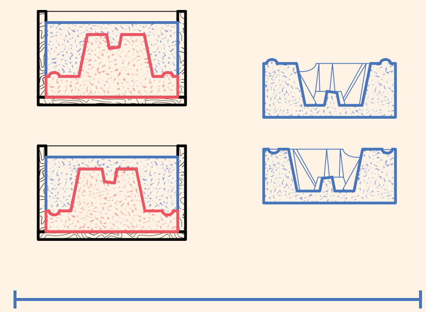
Digital Fabrication



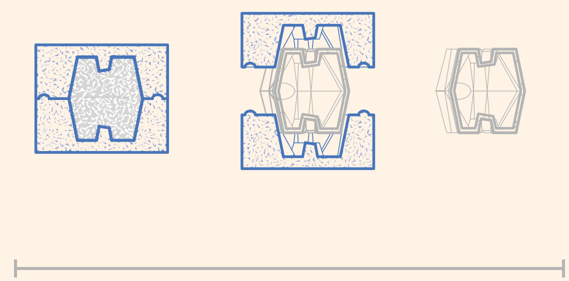
Plaster Mold Production



Master Mold Production



Mass Production



Slip-Casting

The presented collection of short clips displays the various processes employed in the creation and assembly of the structure.

Deployment

Slip-Casting Time-lapse

Veneer Application

Mixing Slip

Draining Excess Slip

Slip-Casting

Mass Producing Plaster Molds

Setting Up Mold

Pouring Silicone

Stirring Silicone

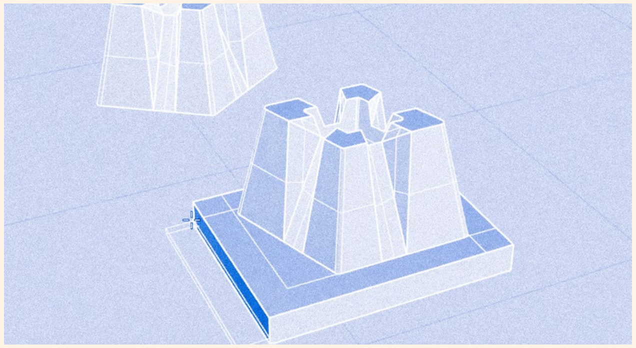
Sealing Mold

Releasing Plaster Mold

Pouring Plaster Mold

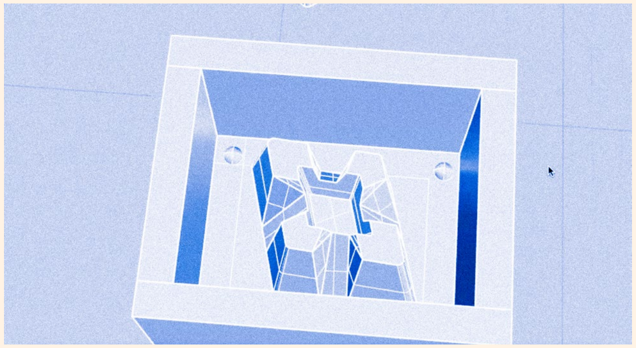
CNC Milling

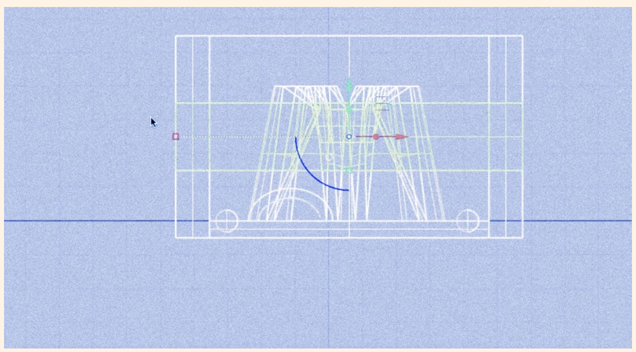
Digital Modeling Mold

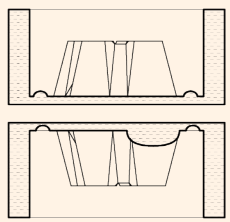


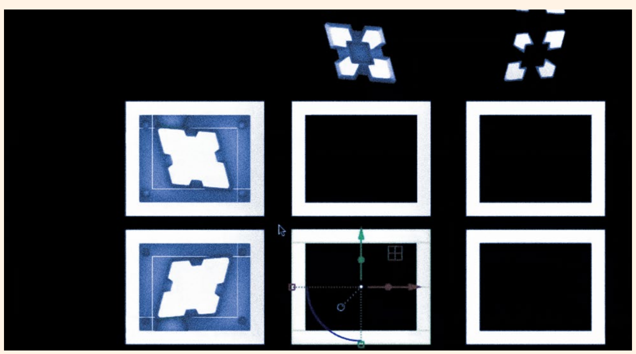
5.1 Digital Fabrication: Rhino

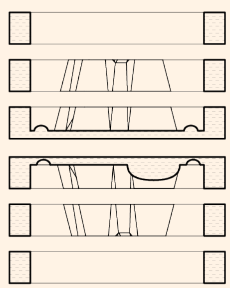
The object is designed in a digital 3D modeling software. It's spliced into six pieces, 2" in height each, corresponding to fabrication requirements.

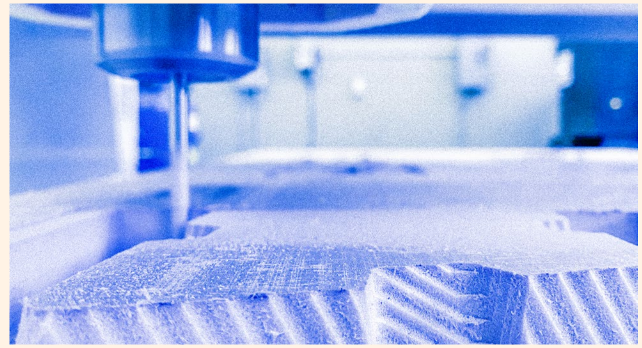






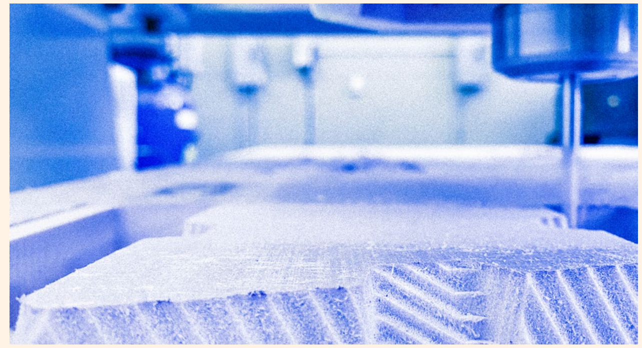


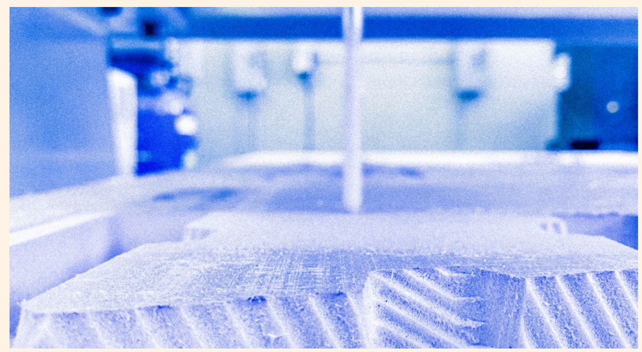


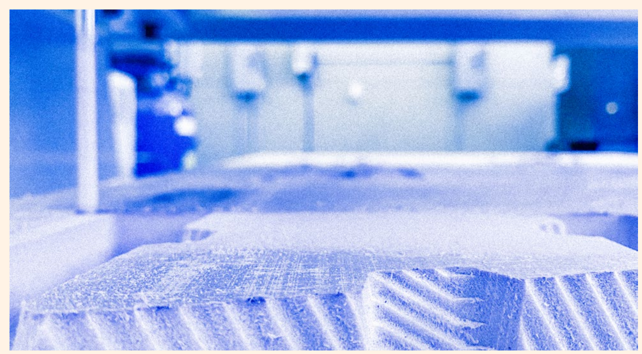


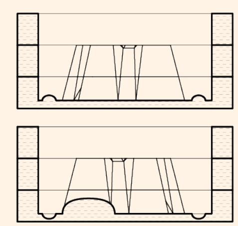
5.2 Digital Fabrication: CNC Mill

The digital file is sent to the CNC mill, a subtractive process that removes material from a 2" block of low density foam.









5.3 Digital Fabrication: Foam Mold

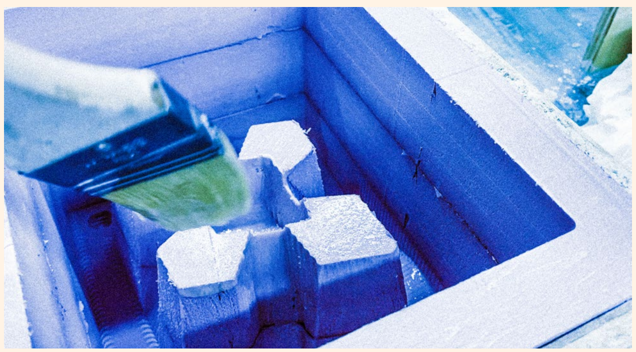
When the mill is completed, the mold pieces are removed from the foam block. They are snapped out from one another, and are vacuum cleaned.

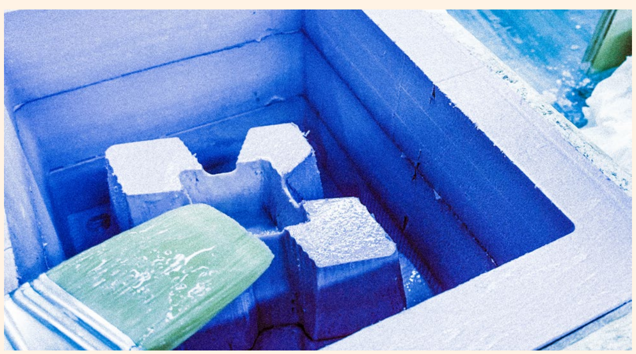
5.4 Digital Fabrication: Foam Mold

The foam mold pieces are assembled, glued and sanded down.

5.5 Plaster Mold: Mold Preparation

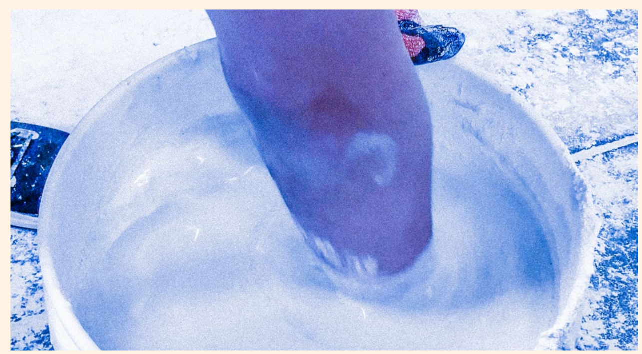
The foam mold receives several layers of mold soap, which acts as a release agent for the plaster.

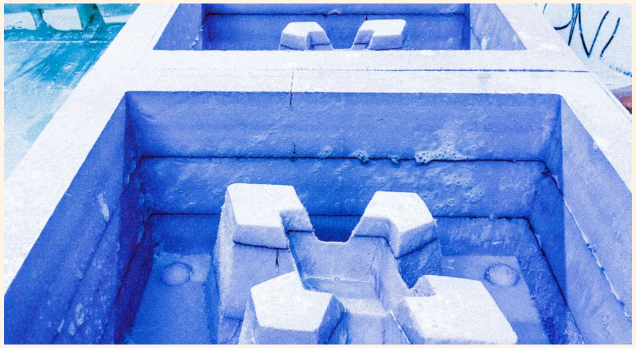


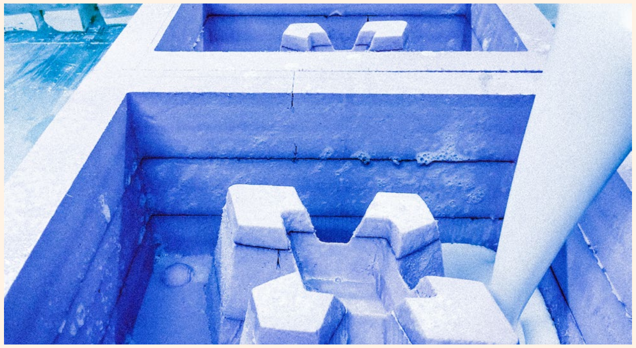


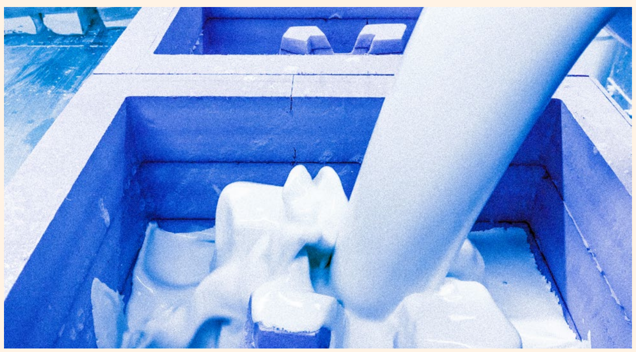
5.6 Plaster Mold: Mixing Plaster

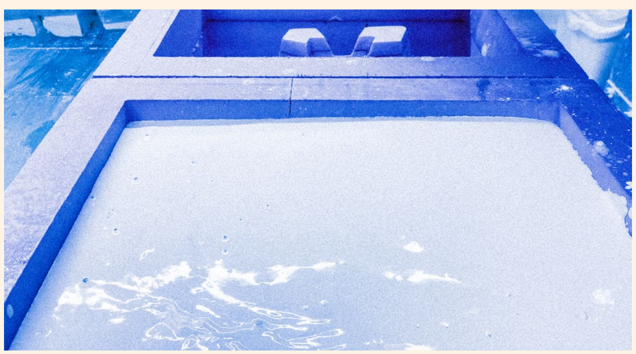
Plaster is mixed into water and left to dissolve for three minutes, followed by three minutes of stirring.





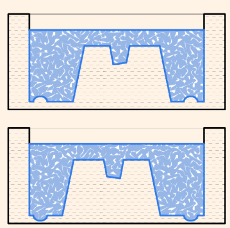


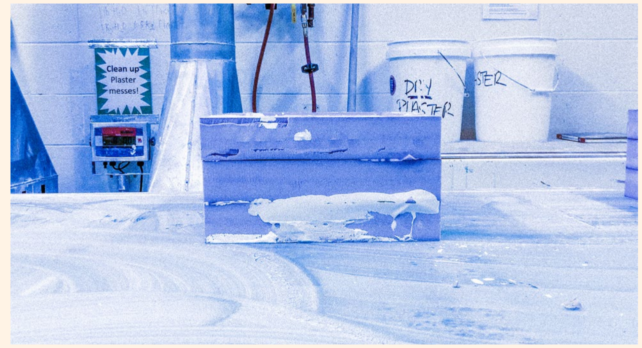




5.7 Plaster Mold: Pouring

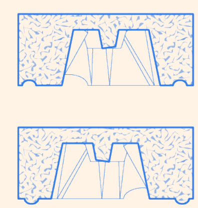
Once the plaster is at an ideal consistency, it is poured into the foam mold, and allowed to cure for about three days.





5.8 Plaster Mold: Release

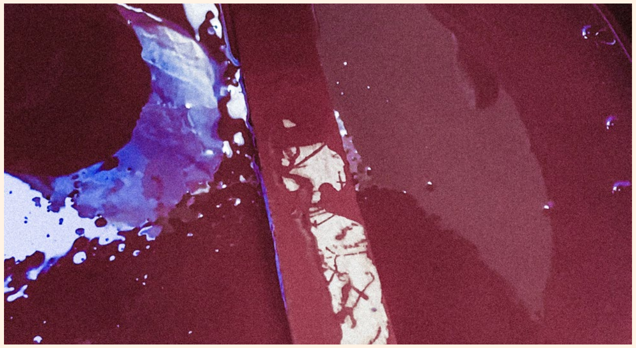
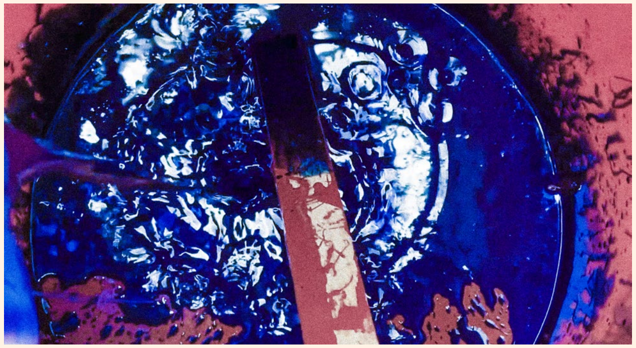
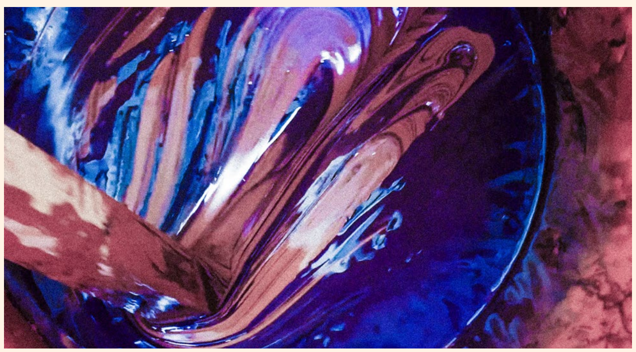
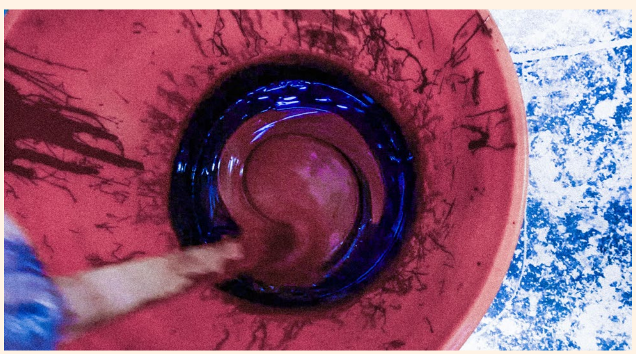
When the plaster is cured, the foam mold is removed from the plaster. This process destroys the original foam mold.



5.9 Master mold making

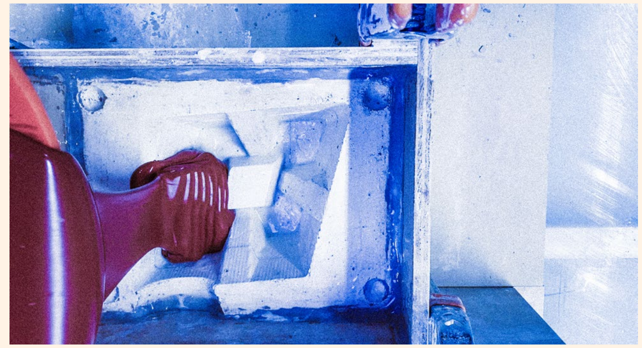
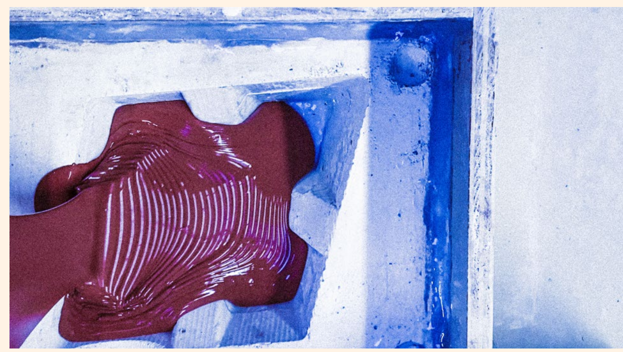
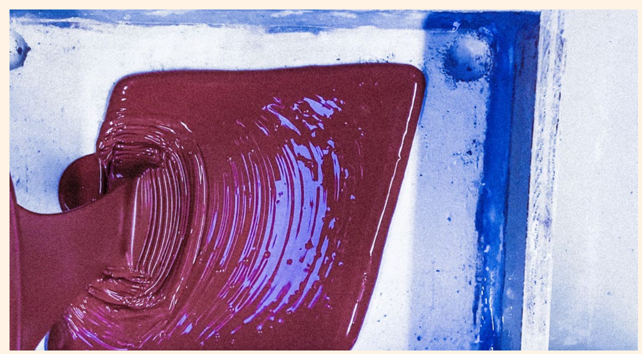
Master Mold

Although the foam-to-plaster mold process could be repeated several times, it is more efficient to create a "master" or "mother" mold, which can easily and quickly mass produce more plaster molds. To do this, a liquid silicone rubber solution was used to capture the form of the original plaster mold. Once it cures, it becomes hard and strong, but flexible enough to easily release from plaster.

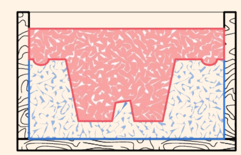
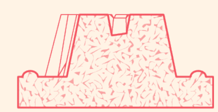
5.10 Master Mold:
Mixing

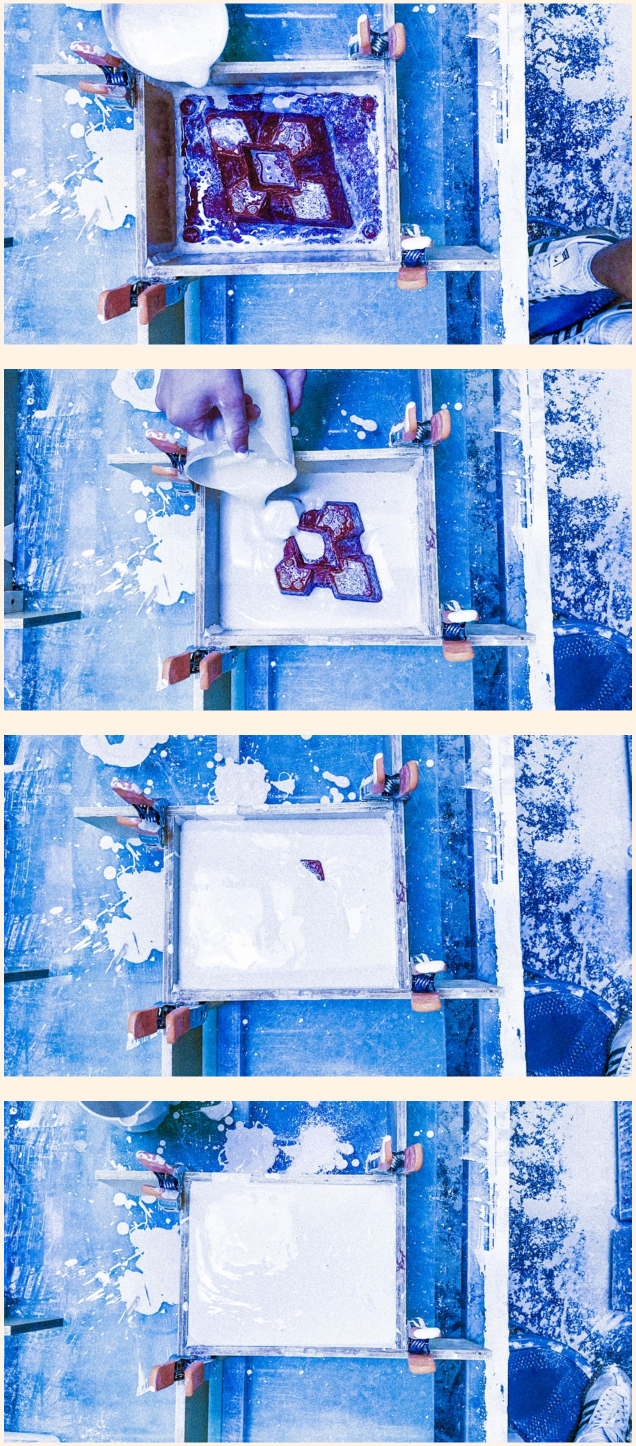
The silicone rubber arrives in two components, which are mixed together in a specific ratio to activate them.

5.11 Master Mold:
Pouring

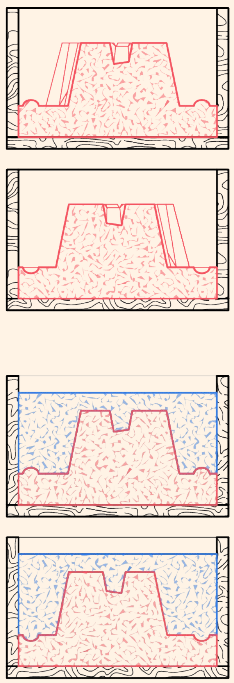
Cottles are setup around the original plaster mold, and seams are sealed with clay. The silicone rubber combination is poured inside, and allowed to cure for 24 hours.



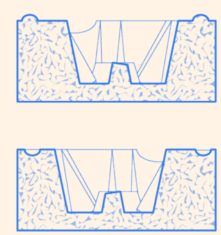
5.12 Mold Mass Production: Plaster Pouring

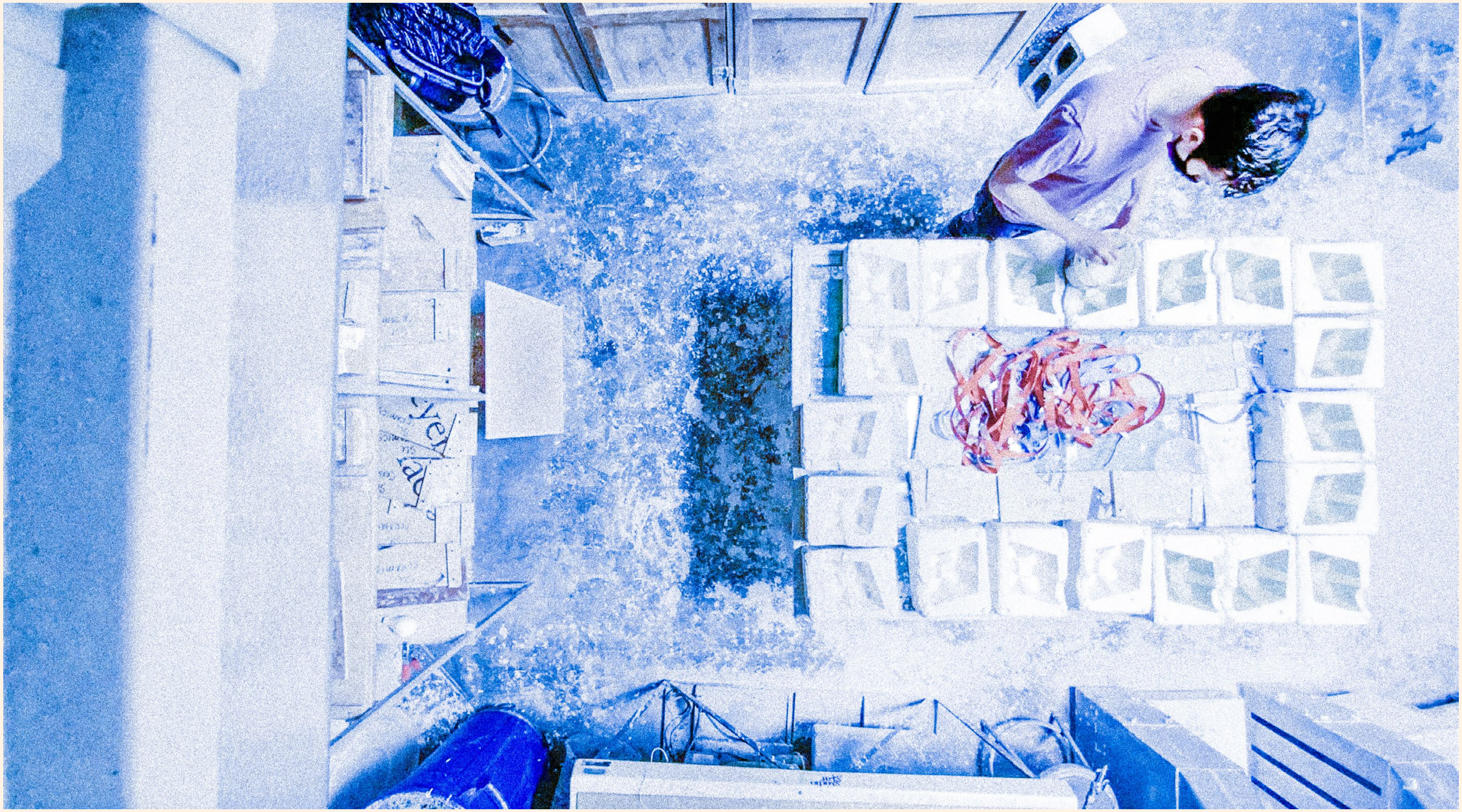
Once the two silicone master molds are complete, they can be used to make copies of the plaster molds. The silicone rubber mold is cottled, the seams are filled with clay, and plaster is poured inside.



5.13 Mold Mass Production: Mold Release

Once the plaster has partially cured, the cottles are removed and the silicone master mold is easily taken out, to be used again for the next pour.





5.14 Slip-Casting overhead view

Slip-Casting

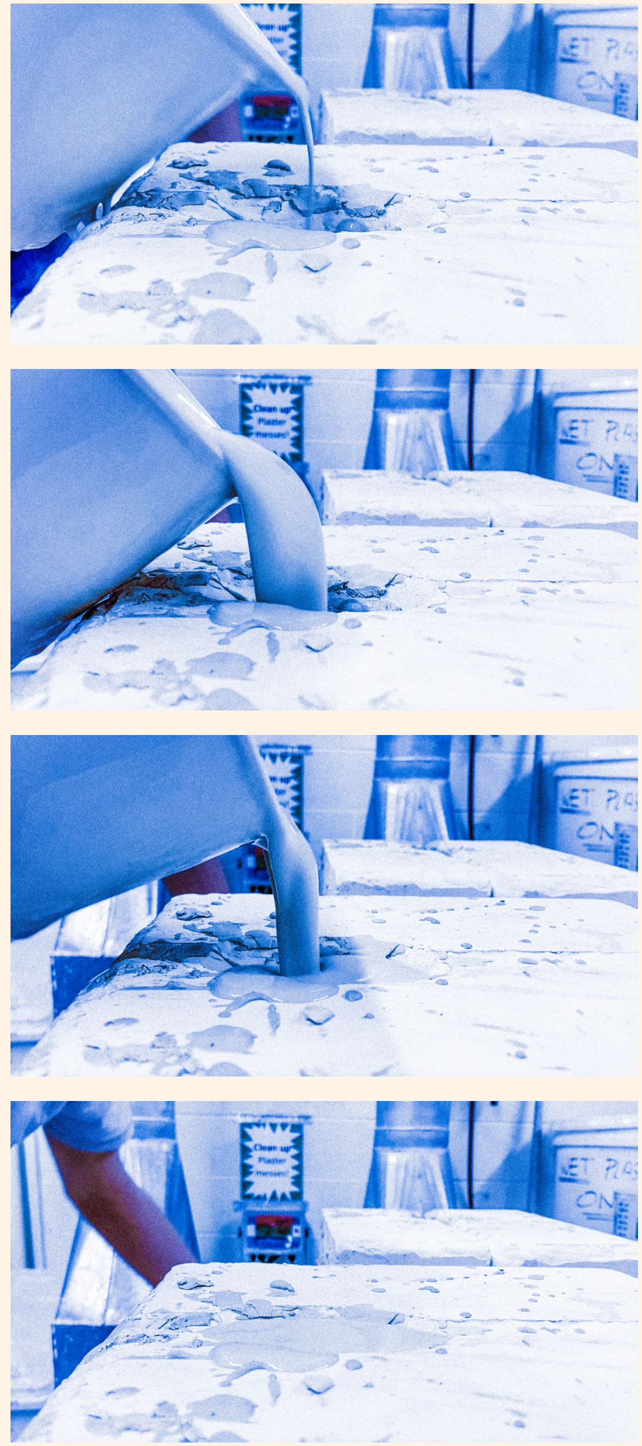
Now that there are 10 plaster molds, the slip-casting process can begin. The mass production of plaster molds with the master silicone mold allows for the simultaneous production of 10 slip-cast blocks. Liquid clay (slip) is poured into the plaster molds, which absorbs moisture from the slip. This leaves a thin layer of clay on the surfaces of the plaster. Depending on how long the slip is allowed to remain inside the mold, the thicker the "shell" of the slip-cast block will be.

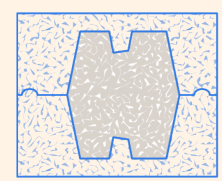
5.15 Slip Casting: Veneer

A coat of stained slip is applied to the interior of the plaster mold with a brush. The plaster mold is then assembled, shut and secured with a belt.

5.16 Slip Casting: Slip Pour

Slip is poured into the mold, and topped off as it settles into the cracks and seams of the plaster mold.





5.17 Master mold making

Draining the Slip

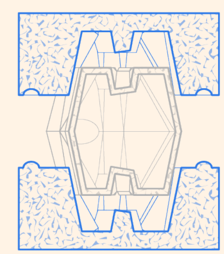
It was determined that the ideal time to drain the excess slip was about one hour with this mold. This leaves a thickness of about 1/2", which is strong enough to support the block and other blocks stacked on top of it, but also conserves materials and keeps the block relatively light-weight.

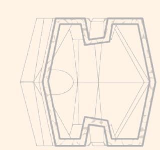
5.18 Slip Casting: Draining

After an hour passes, excess slip is drained from the mold.

5.19 Slip Casting: Mold Release

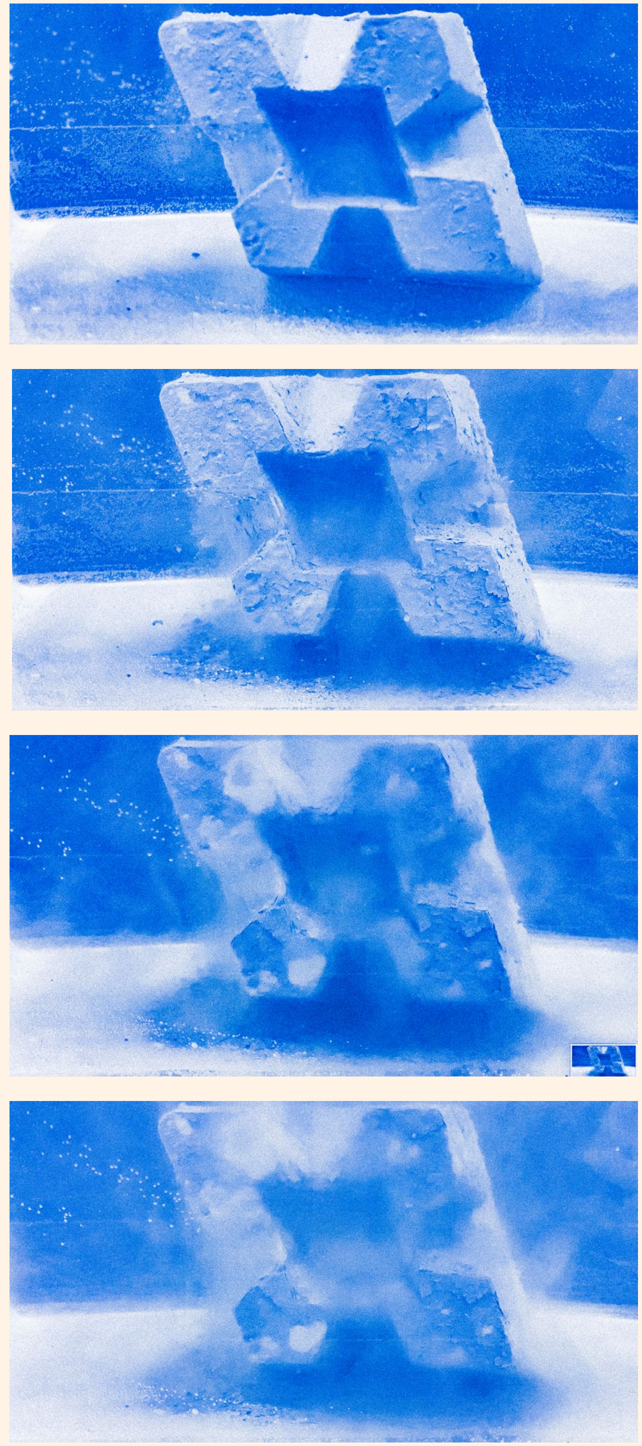
The mold is allowed two hours to dry. The mold is then careful-ly disassembled, to reveal the completed slip-cast object inside.





5.20 Deployment:
Assembly

The objects were then assembled on-site, partially dug into the soil.



5.21 Deployment:
Exposure

The objects are submerged in water, to test their strength capacity to moisture.

5.22 Broken foam mold after plaster mold making

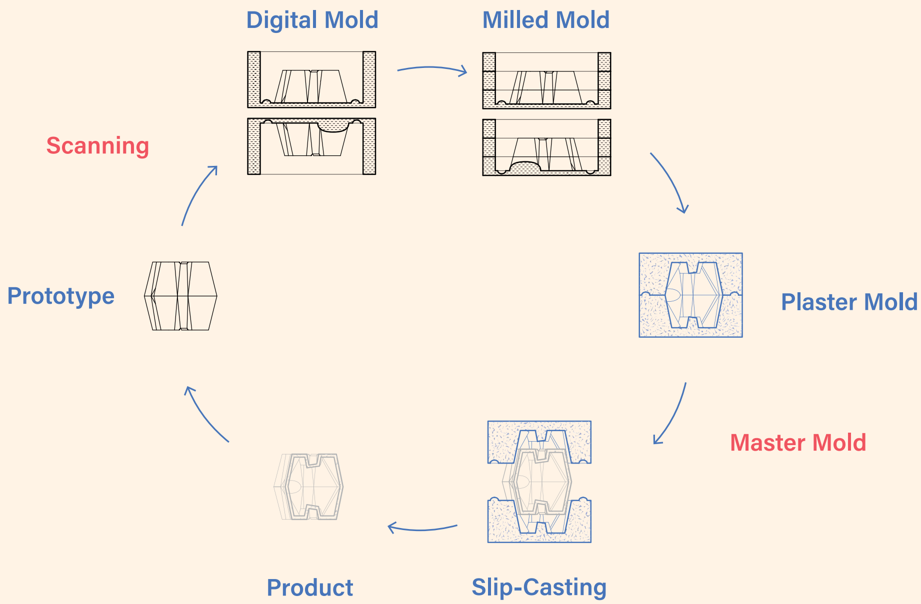
5.23 Pre-made mold library at ComArt

Production Cycle

Once the object is slip-cast, it can be re-inserted into the process by 3D scanning. Photogrammetry or LiDAR scanning re-digitizes the object, capturing physical measurements, textures and voids. This cyclical production loop allows for the possibility to scale the object up or down at each pass of the production loop. In fact, modification and manipulation of the object is possible at each step of the process, effectively causing further alterations in each subsequent step. This allows for countless opportunities for experimentation.

Instead of attempting to control the material, this process is responsive to the material behaviors of clay, even as each step presents challenges to production. As the object moves through the production cycle, it is inherently altered at each step by mishaps, inconsistencies and errors. The resulting object therefore becomes an index of each of the processes that were involved in its inception.

By observing and responding to this data, an iterative process resulted in the object's final form, in order to maximize mold compatibility and strength while minimizing weight, cracking and breakage.



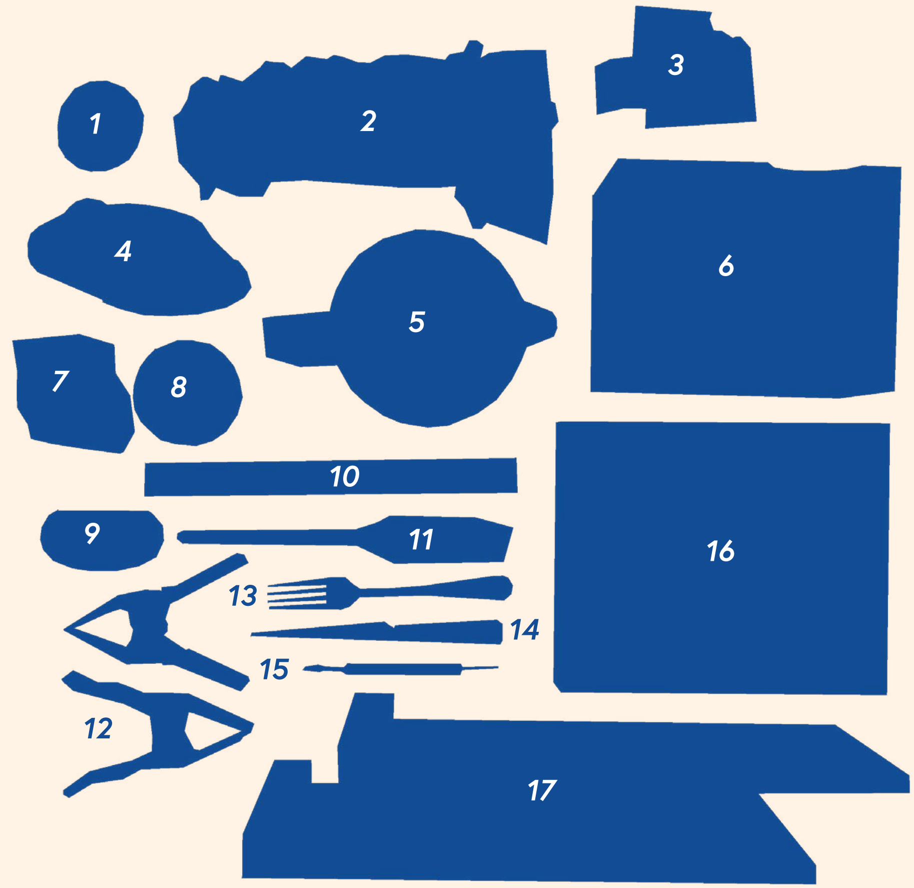
Tools & Mishaps

The various processes employed in the production of this thesis covers a large range of digital and analog tools. The following section highlights the primary analog tools involved in the plaster mold and master mold making process, as well as slip-casting. Unsurprisingly, many of the tools were reused at various parts of the process. Common tools, such as a kitchen fork and knife were some of the most useful.

Nearly all production was completed at the Comstock Art Facility, part of the Syracuse University School of Visual and Performing Arts. The work spaces are communal, hosting an array of signs reminding students to "clean-up after yourself" and that no plaster is allowed in the sink. Looking at these signs in isolation allows for a glimpse into some of the most common mishaps experienced throughout the process. Residual materials from previous steps, for example, could contaminate the process, such as small pieces of plaster getting caught in clay - causing an explosion in the kiln when fired at high temperatures.

6.1 Various signs found in the ceramic rooms at ComArt

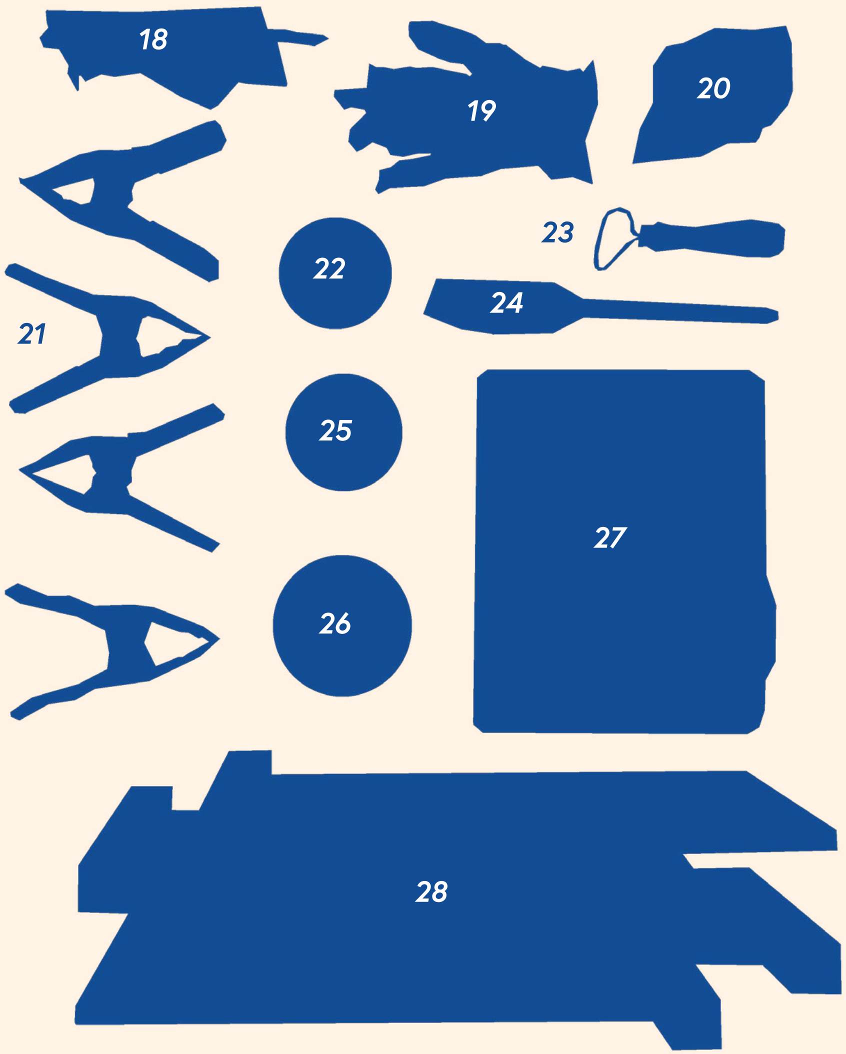
6.2



Plaster Mold Making

1. sponge
2. dry plaster
3. sandpaper
4. mold soap bottle
5. water
6. completed plaster mold
7. plasticine
8. mold soap in cup
9. metal rib
10. ruler
11. brush
12. spring clamp
13. fork
14. fettling knife
15. clean up tool
16. foam mold piece
17. cottles

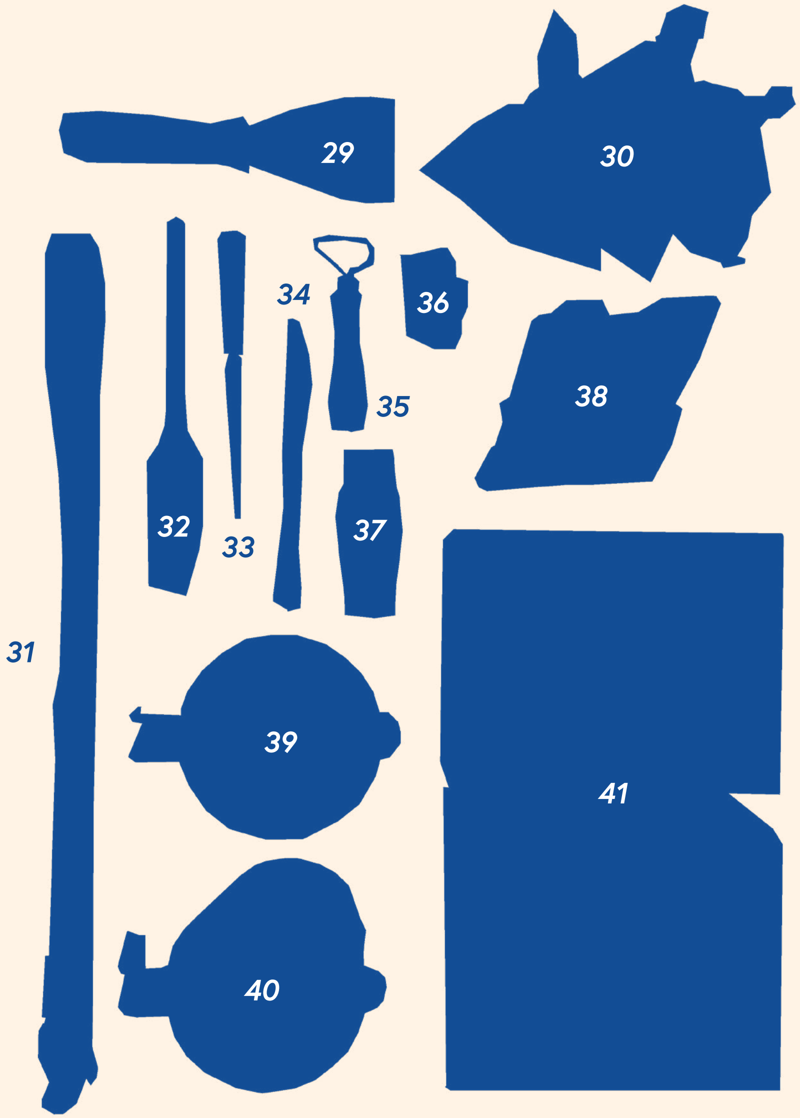
6.3



Master Mold Making

18. silicone rubber residue
19. latex glove
20. plasticine
21. spring clamp
22. sponge
23. ribbon tool
24. brush
25. mold max 60 "part B"
26. spray bottle with mold soap
27. completed master mold
28. cottles

6.4



Slip-Casting

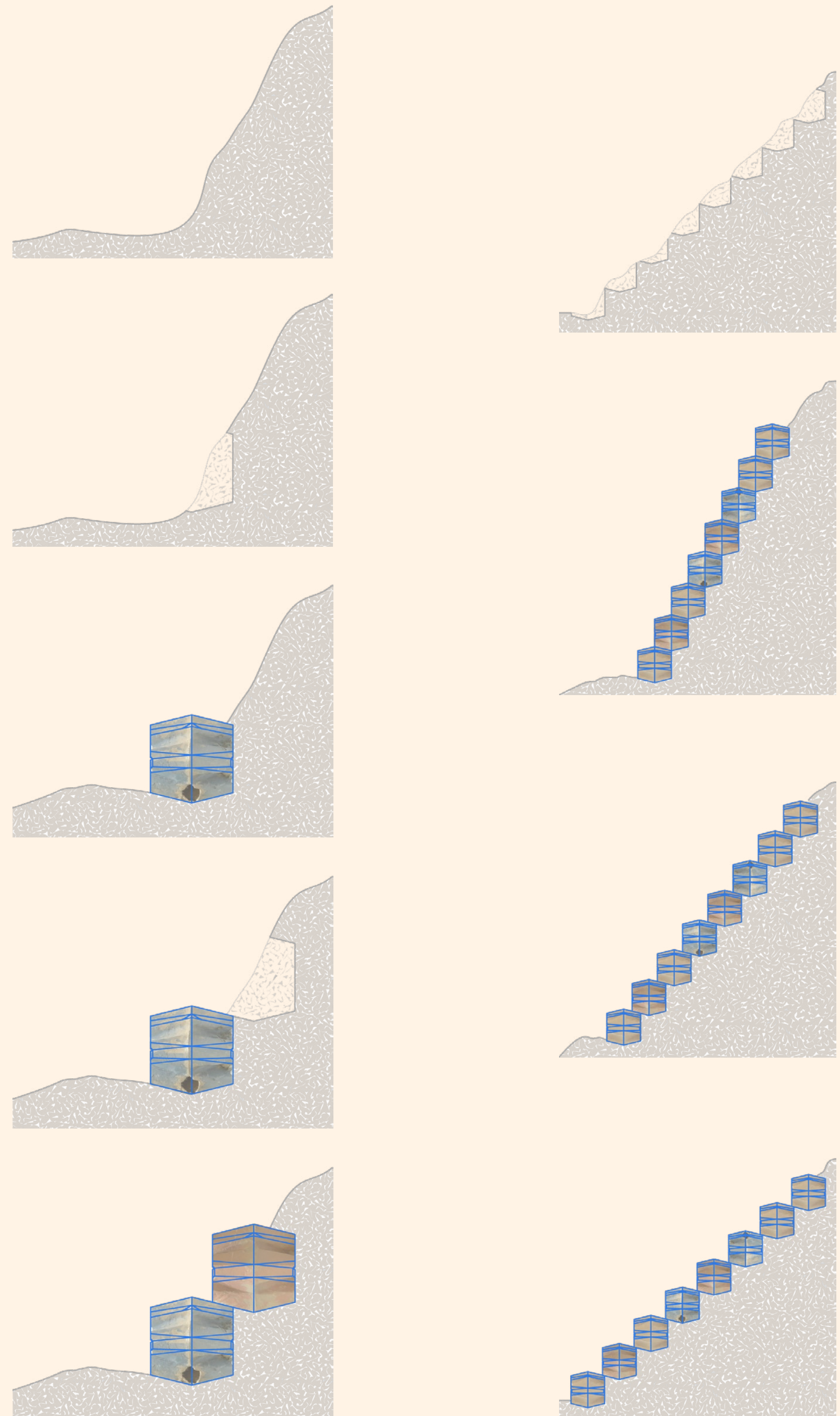
29. spatula
30. dry mason stains
31. belt
32. brush
33. fettling knife
34. knife
35. ribbon tool
36. clay
37. hand cream
38. completed slip-cast
39. mason stain mixed into slip
40. slip
41. plaster molds

Assembly & Deployment

When working through the planning stages of the deployment process, simplified and scaled down blocks were cast and deployed into a test site. The blocks needed to maintain integrity, as well as a modular connection system when sitting in the site. The blocks were partially dug into the soil, allowing for the earth to buttress some of their weight and minimize the overall load on the structure.

In the final iteration of the objects, the form maximized surface area by adding more creases, bends and indents to take advantage of the layering of slip at these moments. These changes made the blocks stronger, while still minimizing its weight and reducing slip consumption.

Further, the form allows for a degree of flexibility during deployment, as they can be shifted to accommodate for differing slopes on the deployment site, as seen in the accompanying diagram. These shifting conditions allowed for the blocks to avoid obstacles on the site, and to more effectively navigate anomalies in the slope.

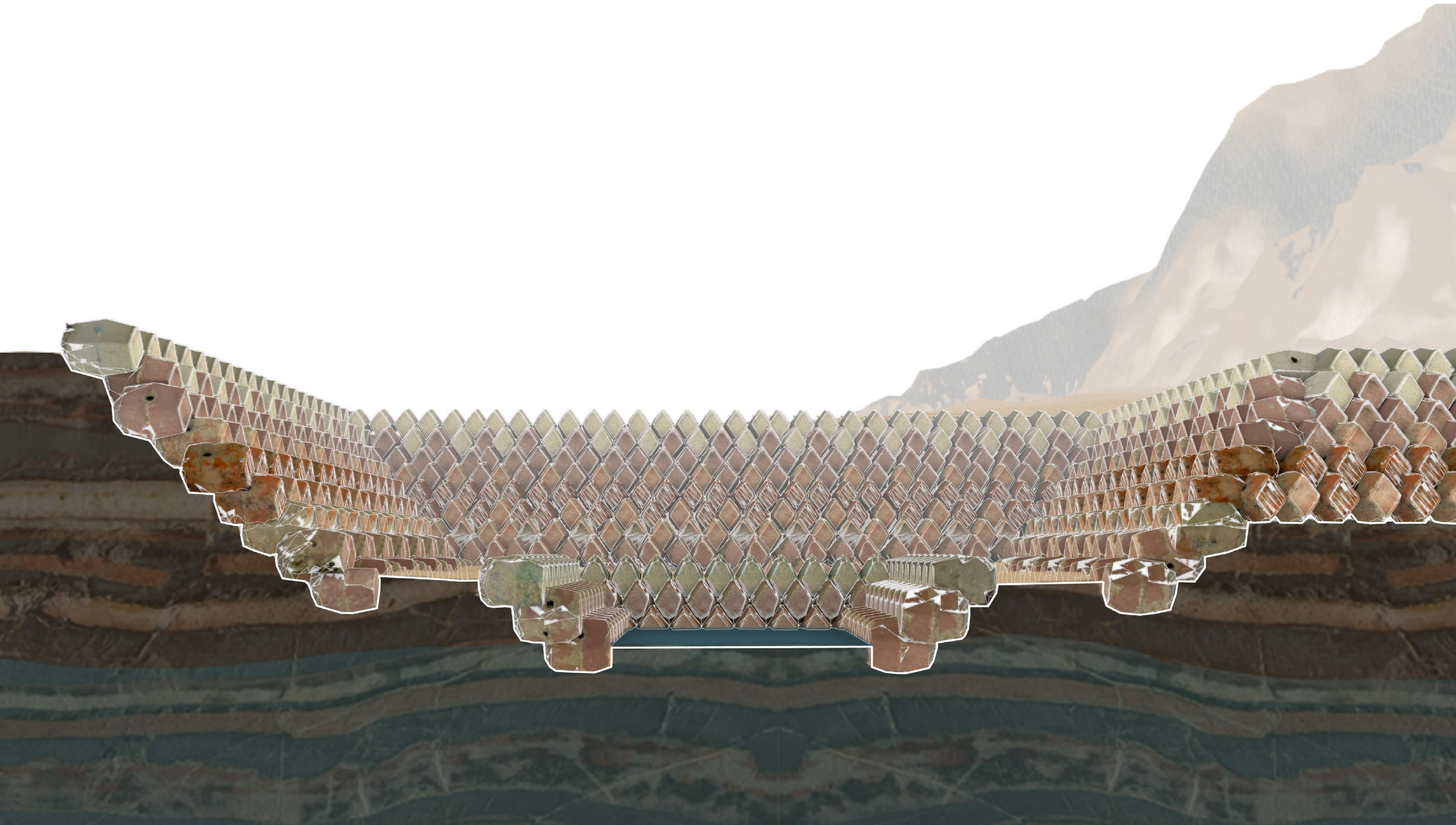


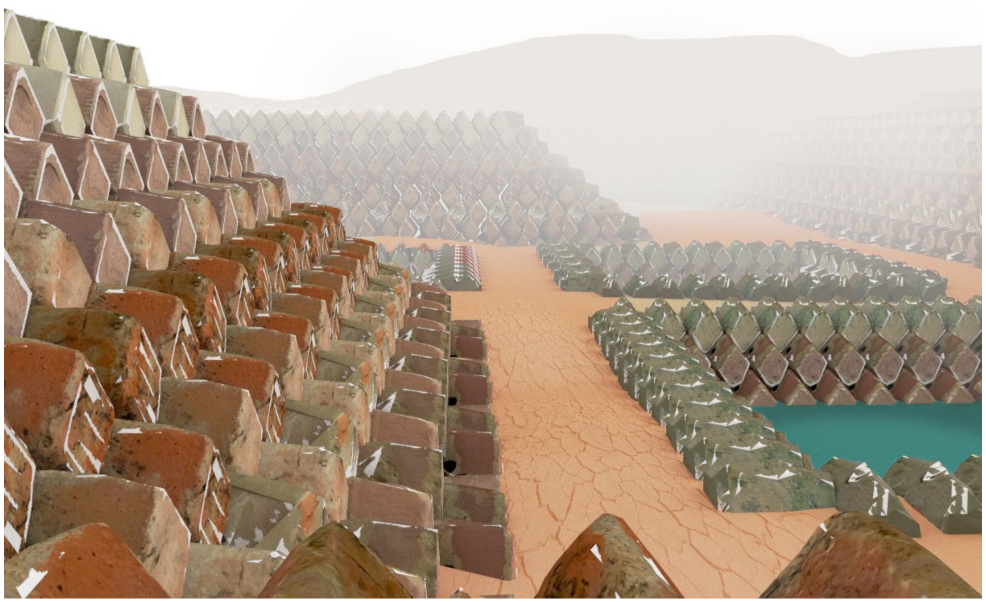
7.1 Residue on site after deployment

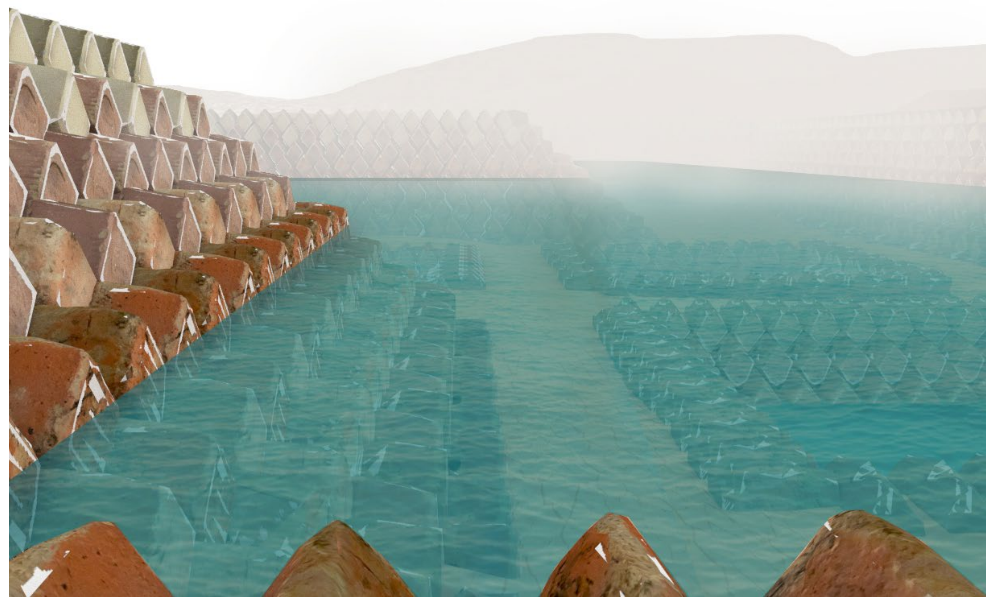
7.2 Deployment test

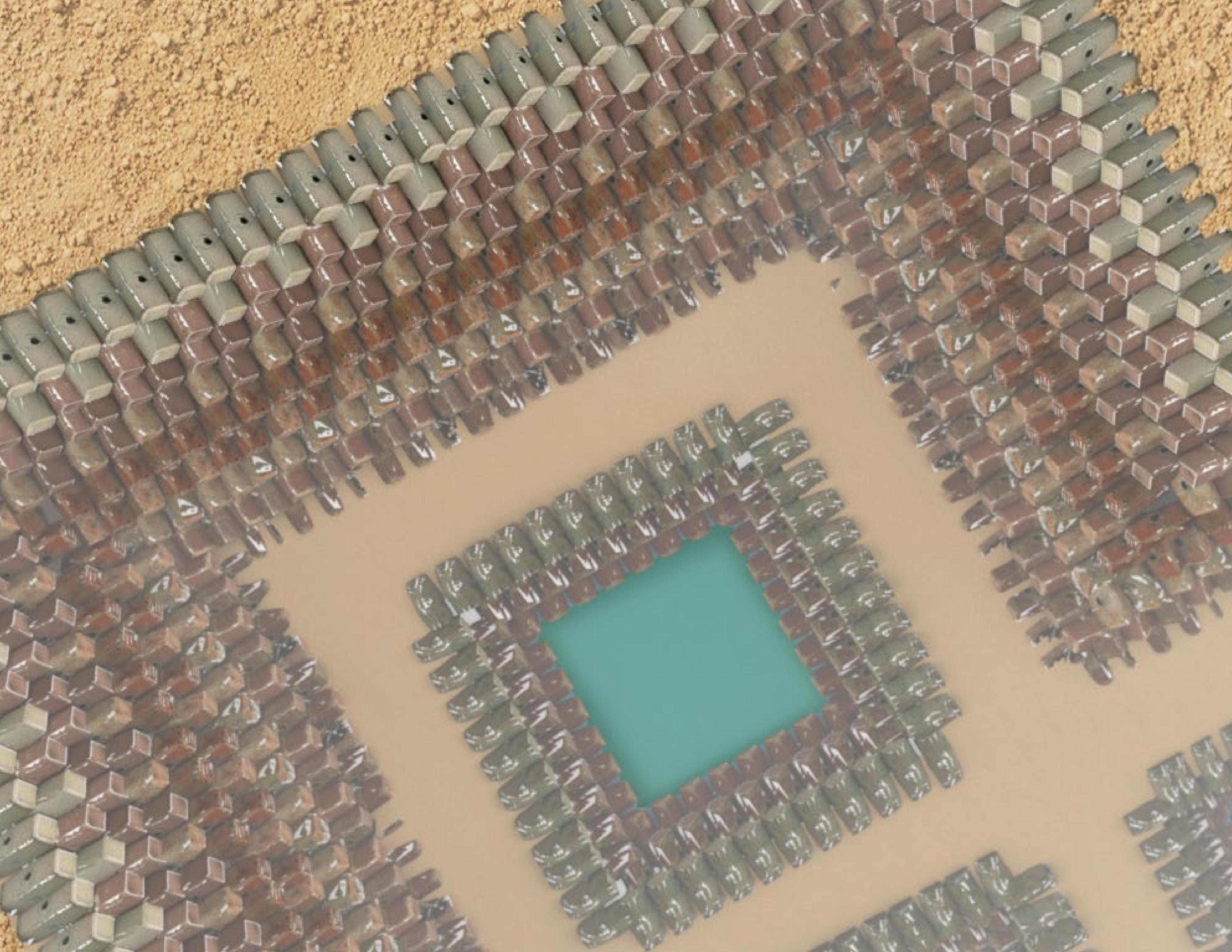
7.3 Test blocks after site deployment

7.4 Top view of deployed test blocks

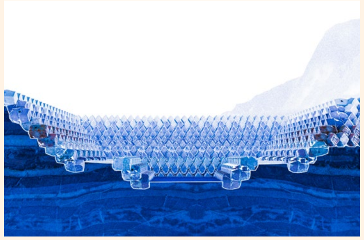




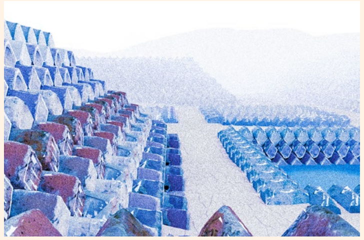




7.5 Sectional perspective of well

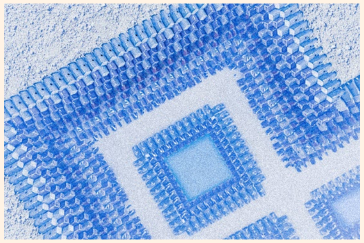


7.6 Perspective view of well with low water level

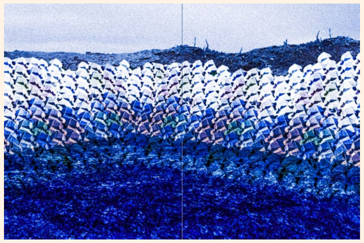


7.7 Perspective view of well with high water level

7.8 Top view of well



7.9 Perspective of view with modified blocks



Physical & Digital Decay

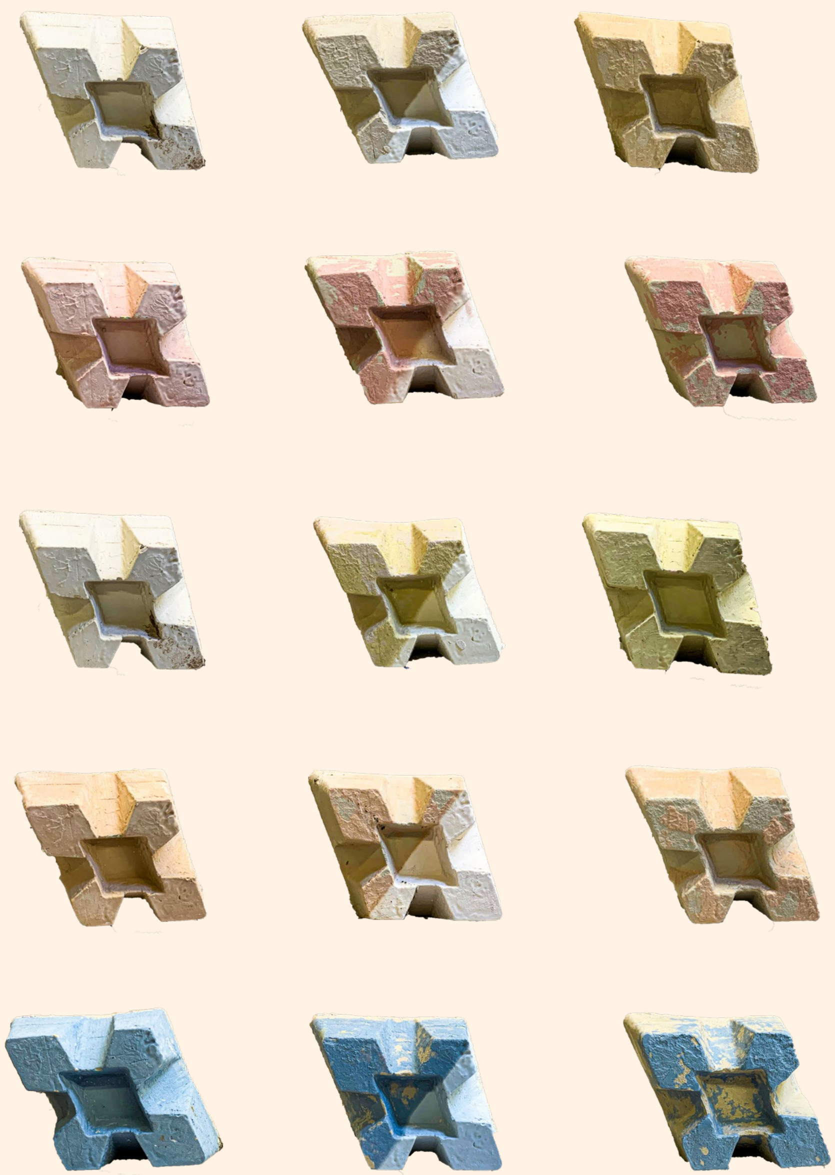
While the blocks are unfired, they are extremely absorbent and deteriorate when exposed to humidity. During this stage, they are very effective registrants of hydrological phenomena: marking water exposure with changes in color, texture and thickness.

Different phenomena affect the block in various ways and at different rates. Factors such as water temperature, intensity, pressure and humidity were explored. Water exposure tests occurred both indoors under controlled conditions, and outside under environmental conditions. After these tests, some of the objects were bisque fired to "seal" these changes. Once the objects are fired, they become significantly stronger, but no longer able to register hydrological changes.

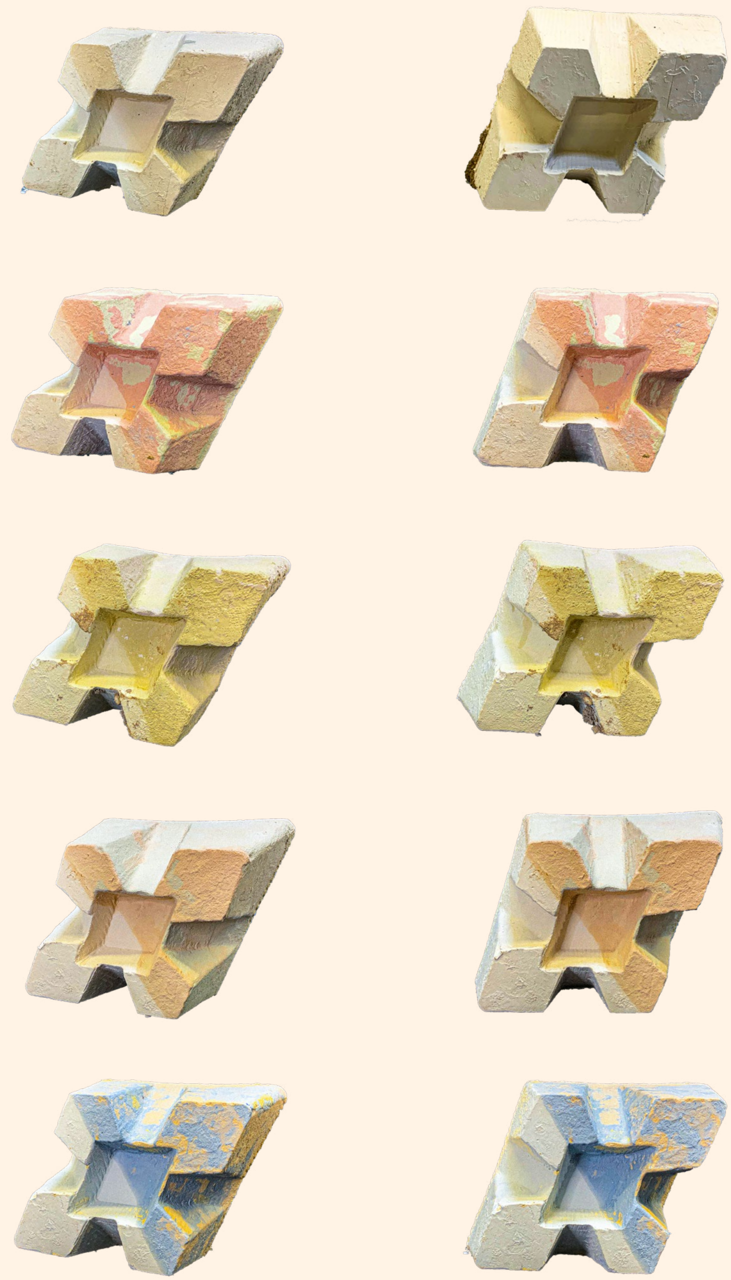
In addition to the physical decay of the block, digital deterioration techniques were also explored. As the object was scanned, there was always inherent data loss. This was most profound in the areas that were out of view of the camera, specifically where the object touched a surface. However, digital data loss also occurred throughout, due to errors in camera positioning, low resolution and lighting inconsistencies.

During the 3D scanning and modeling process, these mishaps were further exaggerated through various digital alterations.

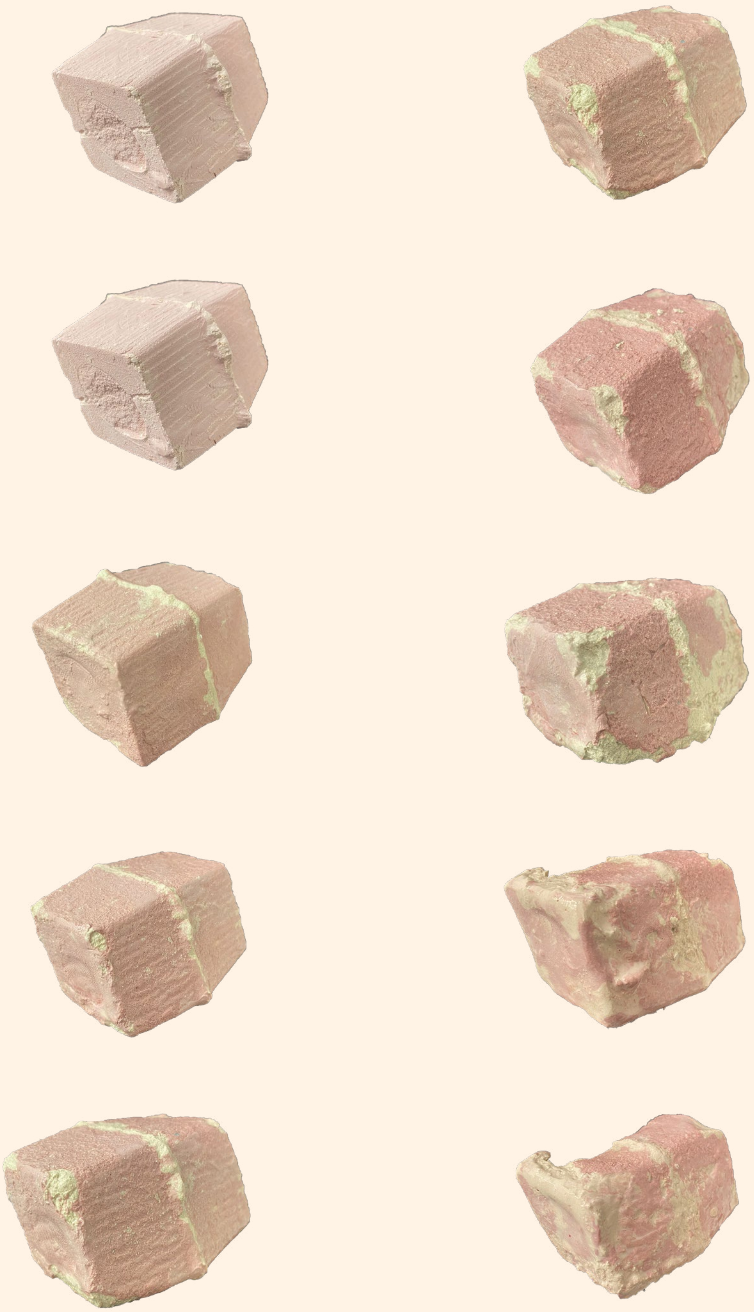
8.1 Various views of three test blocks after bisque firing



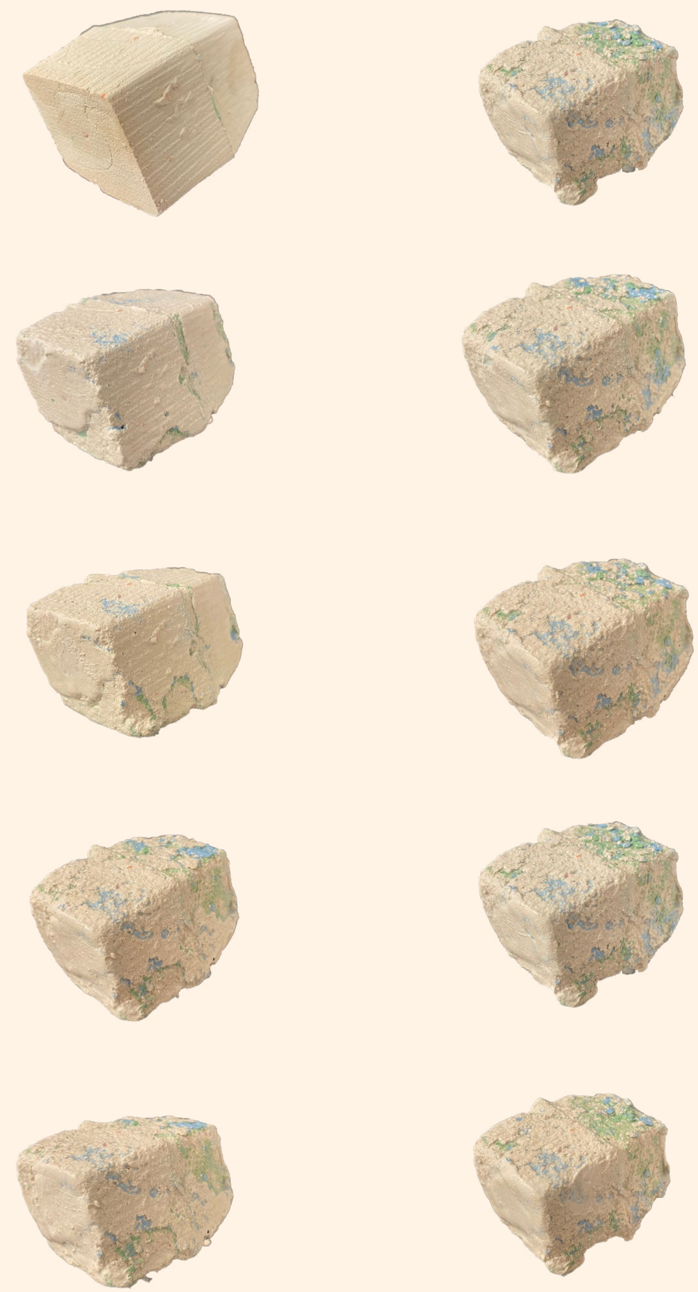
8.2 Submerged blocks. Left: before exposure, center: half-submerged, right: after submergence



8.3 Half-submerged blocks



8.4 Pink-stained test block undergoing submergence tests over the course of ten minutes

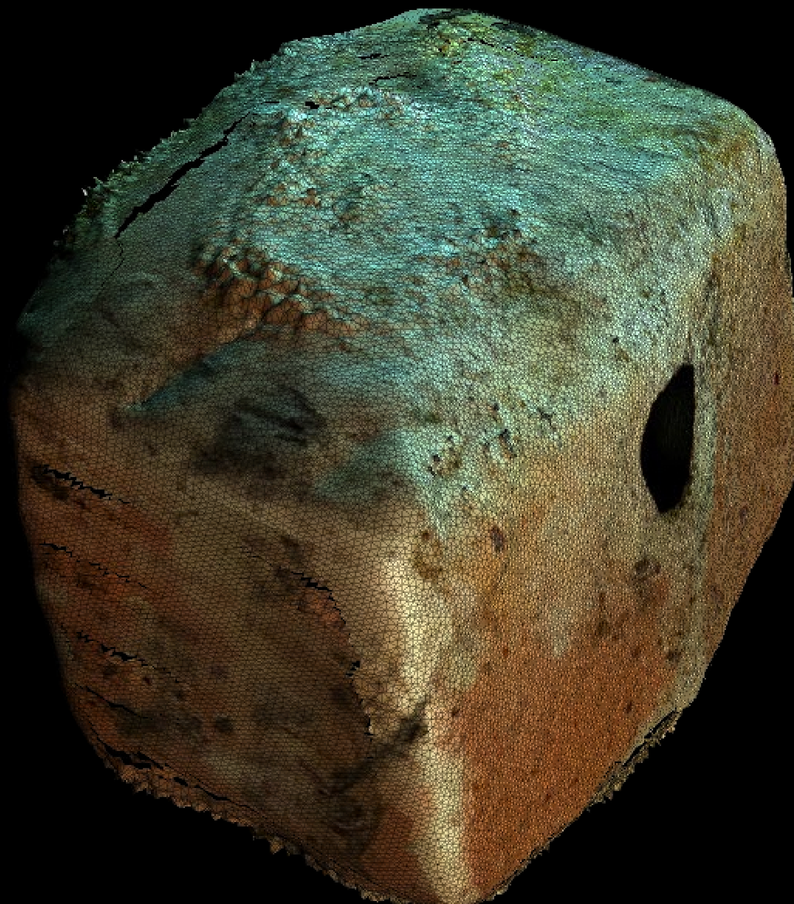


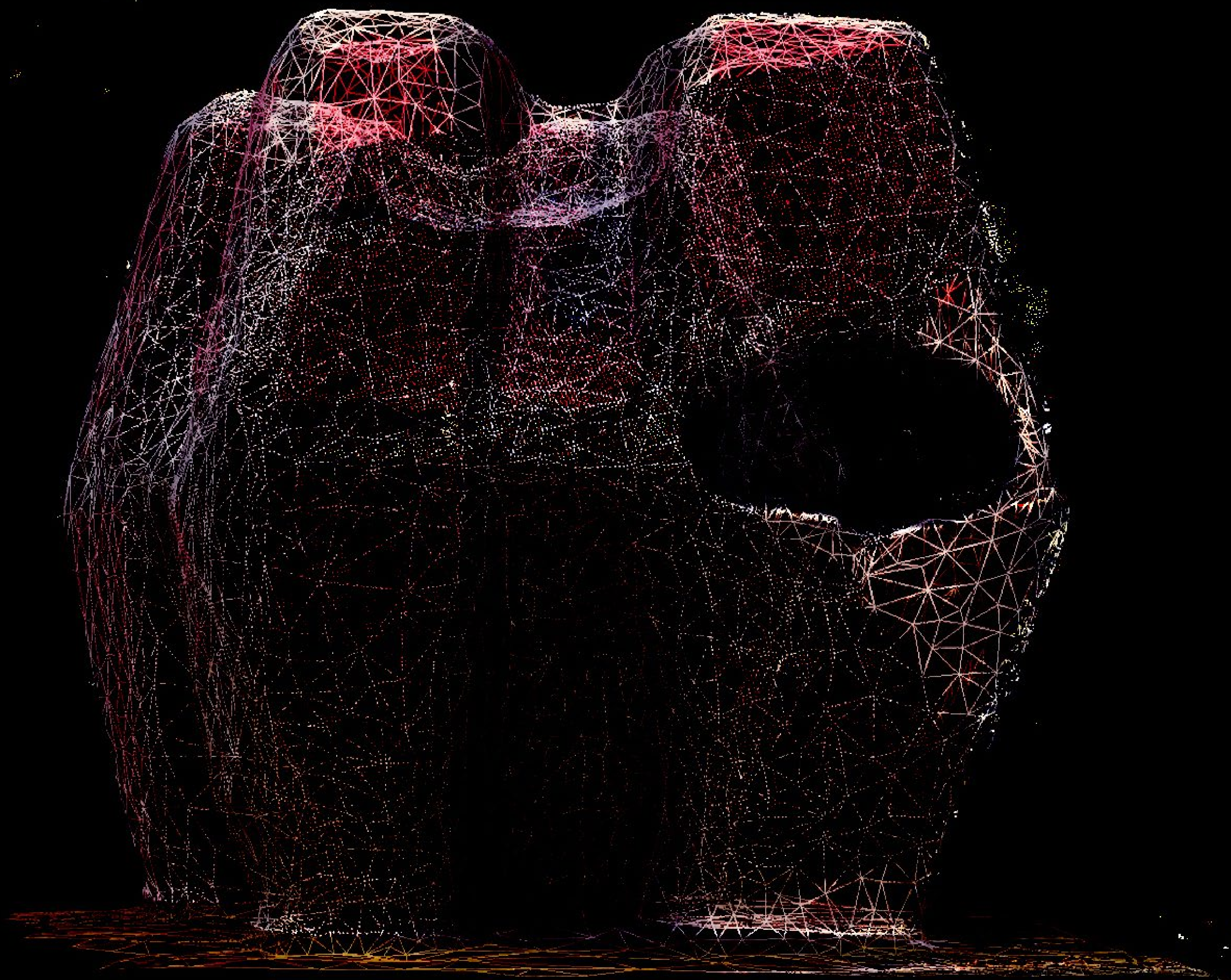
8.5 Blue/green-stained test block undergoing submergence tests over the course of ten minutes

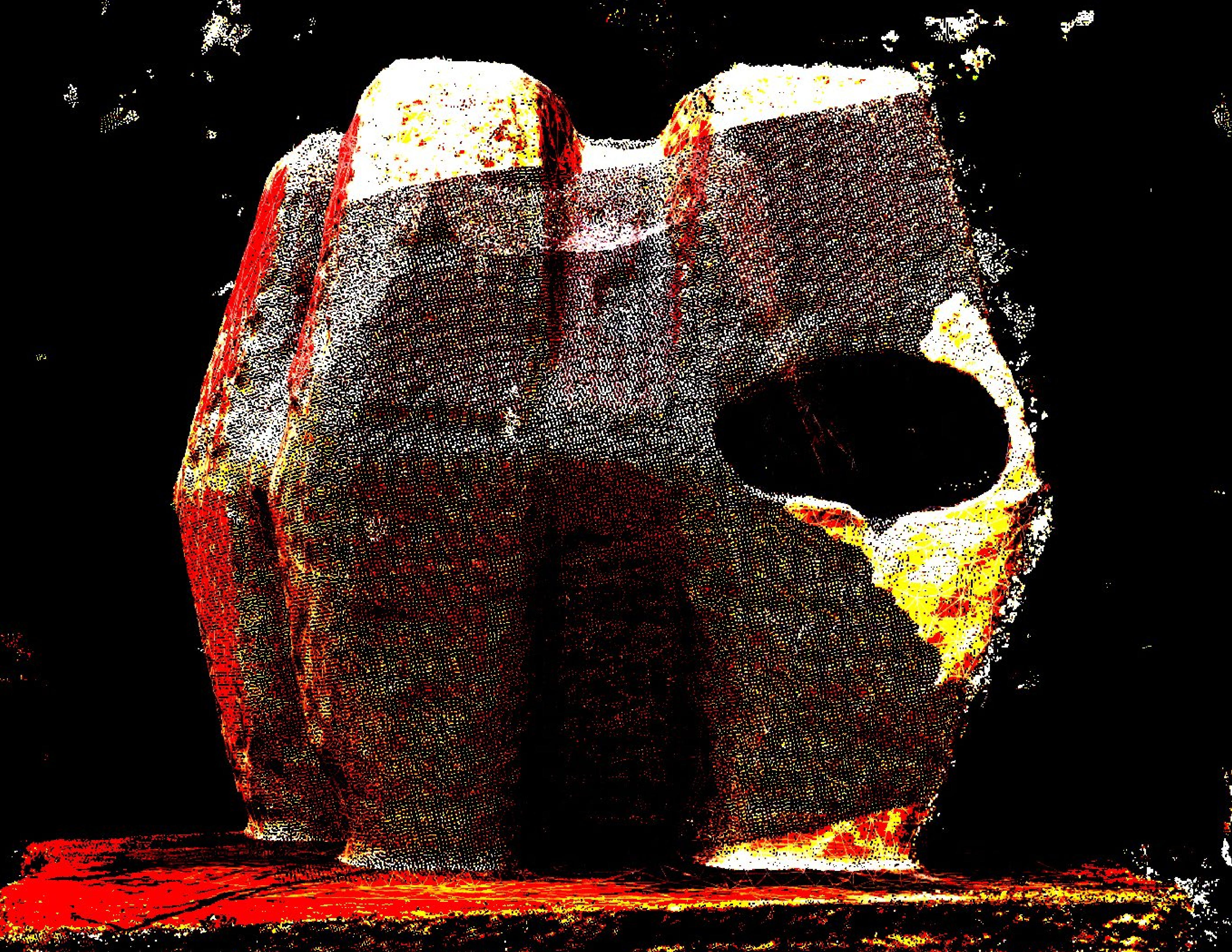
8.6 Block after being left out in the rain for two days

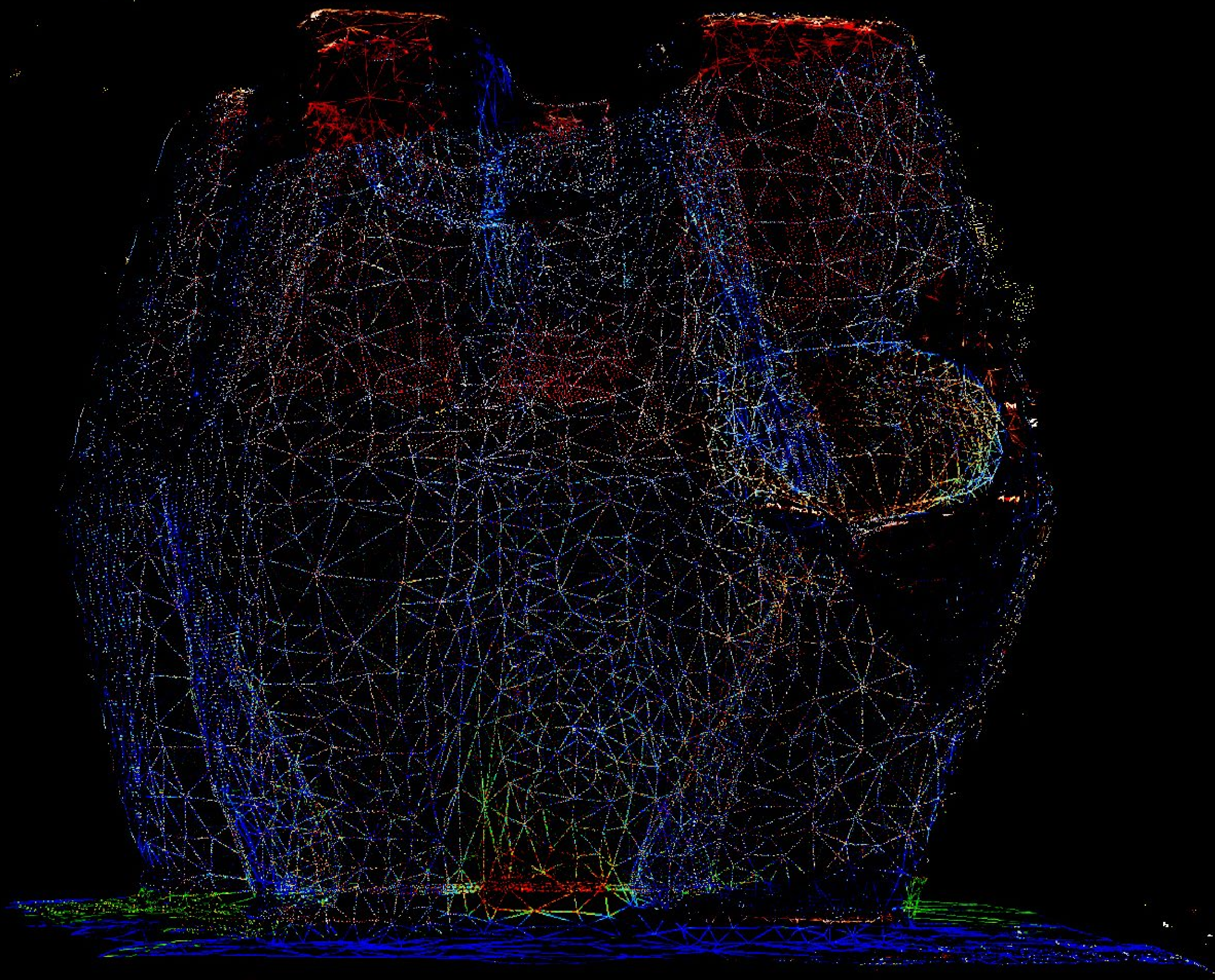
8.7 Block after water exposure and bisque firing

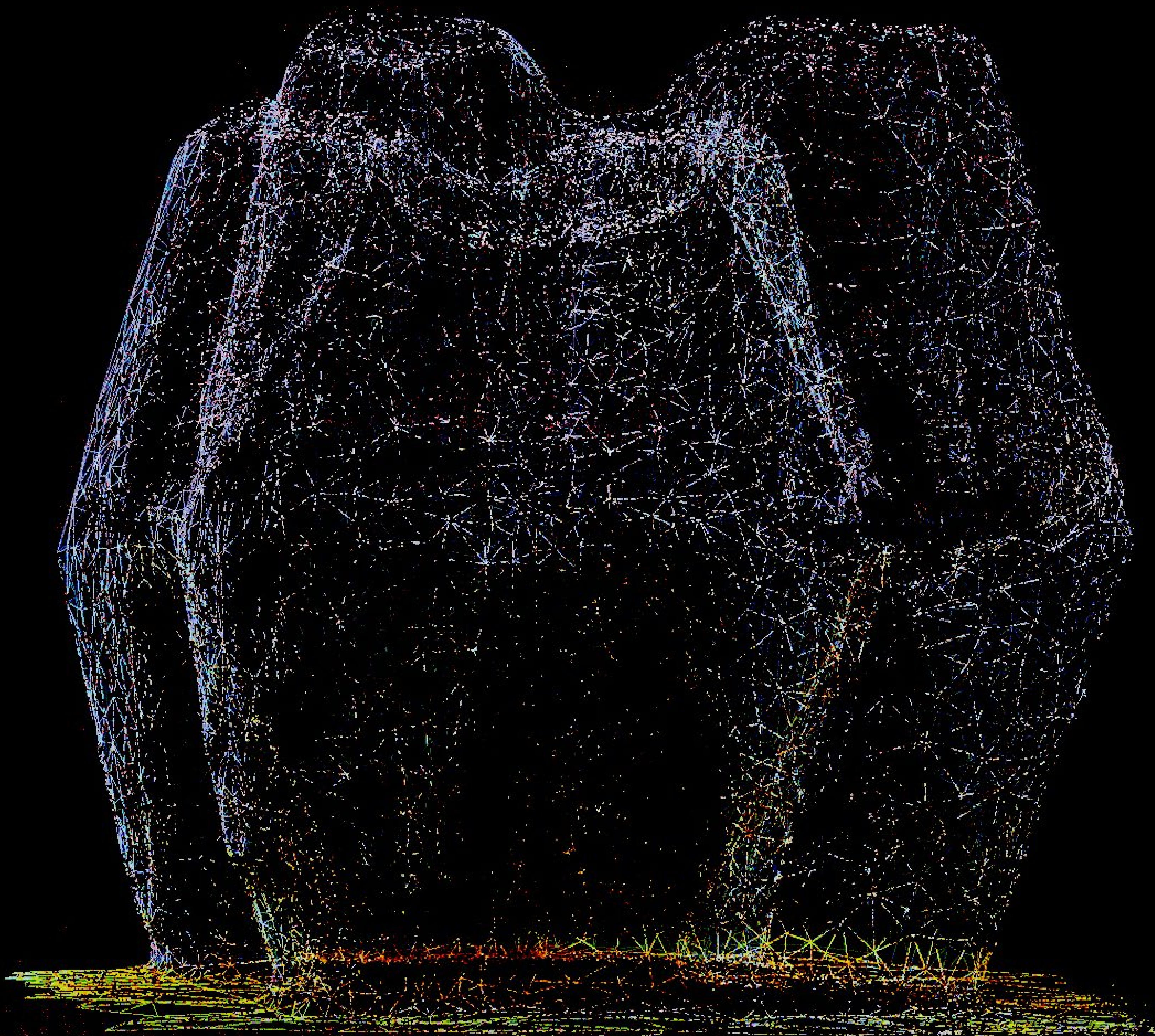
8.8 Texture view of a block exposed to rainwater outside

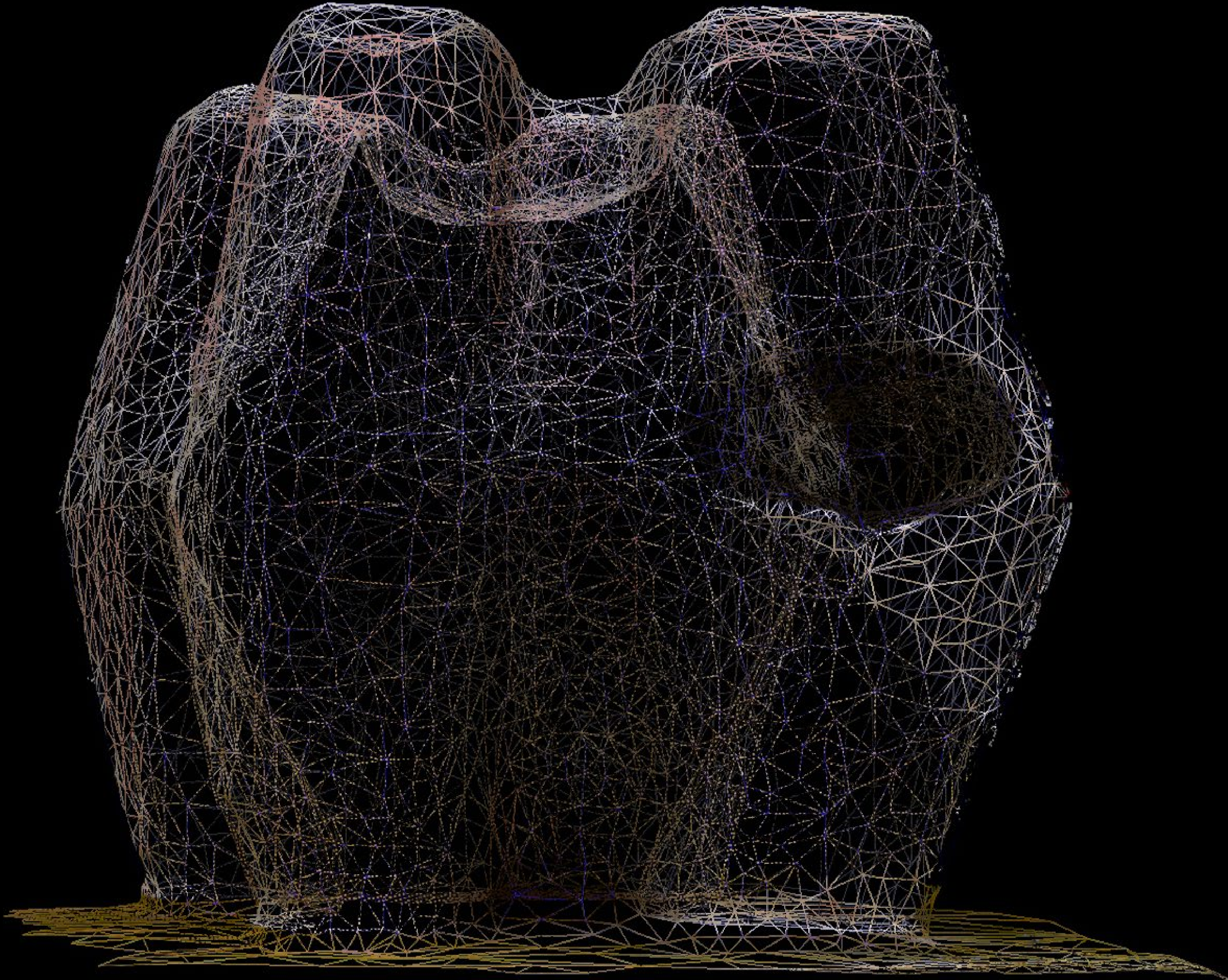


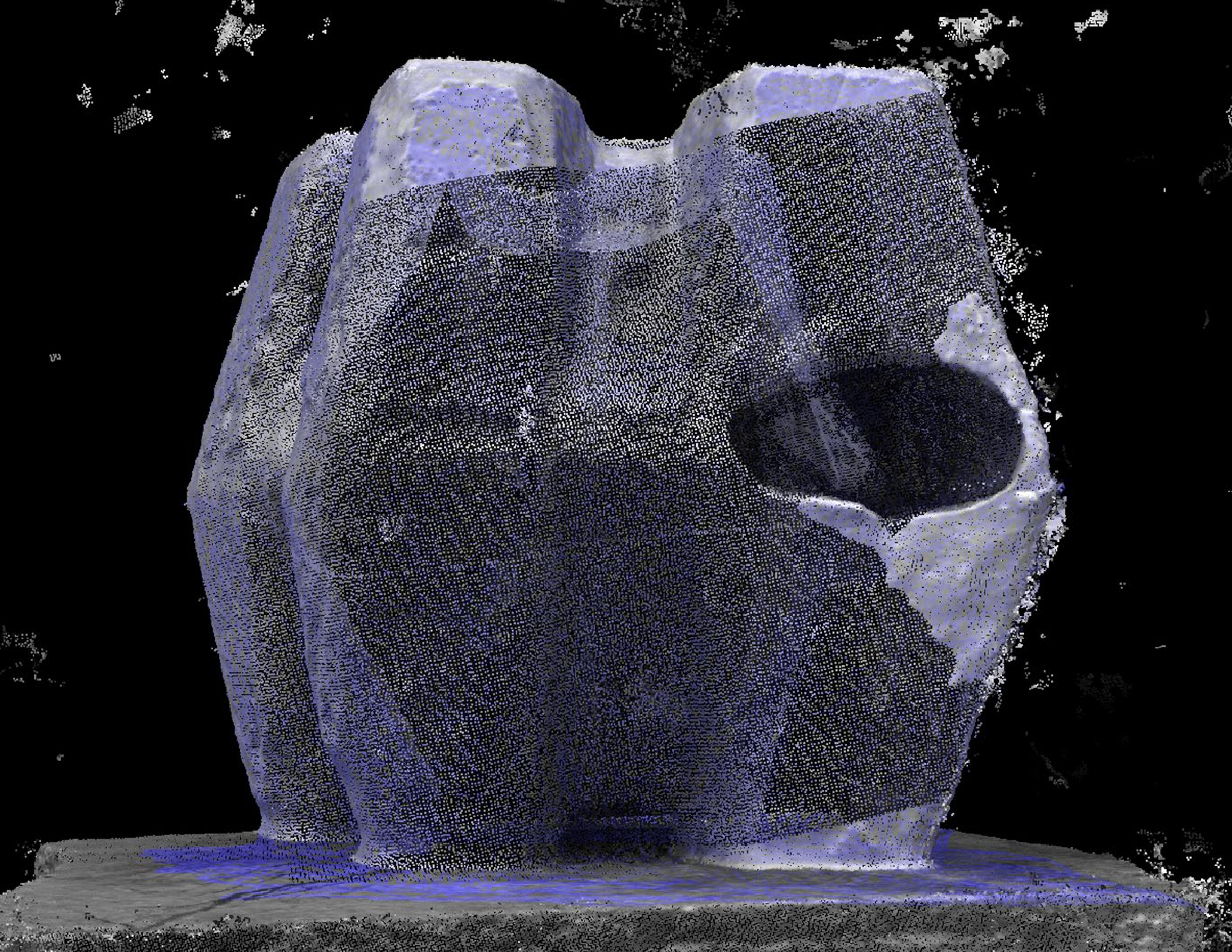


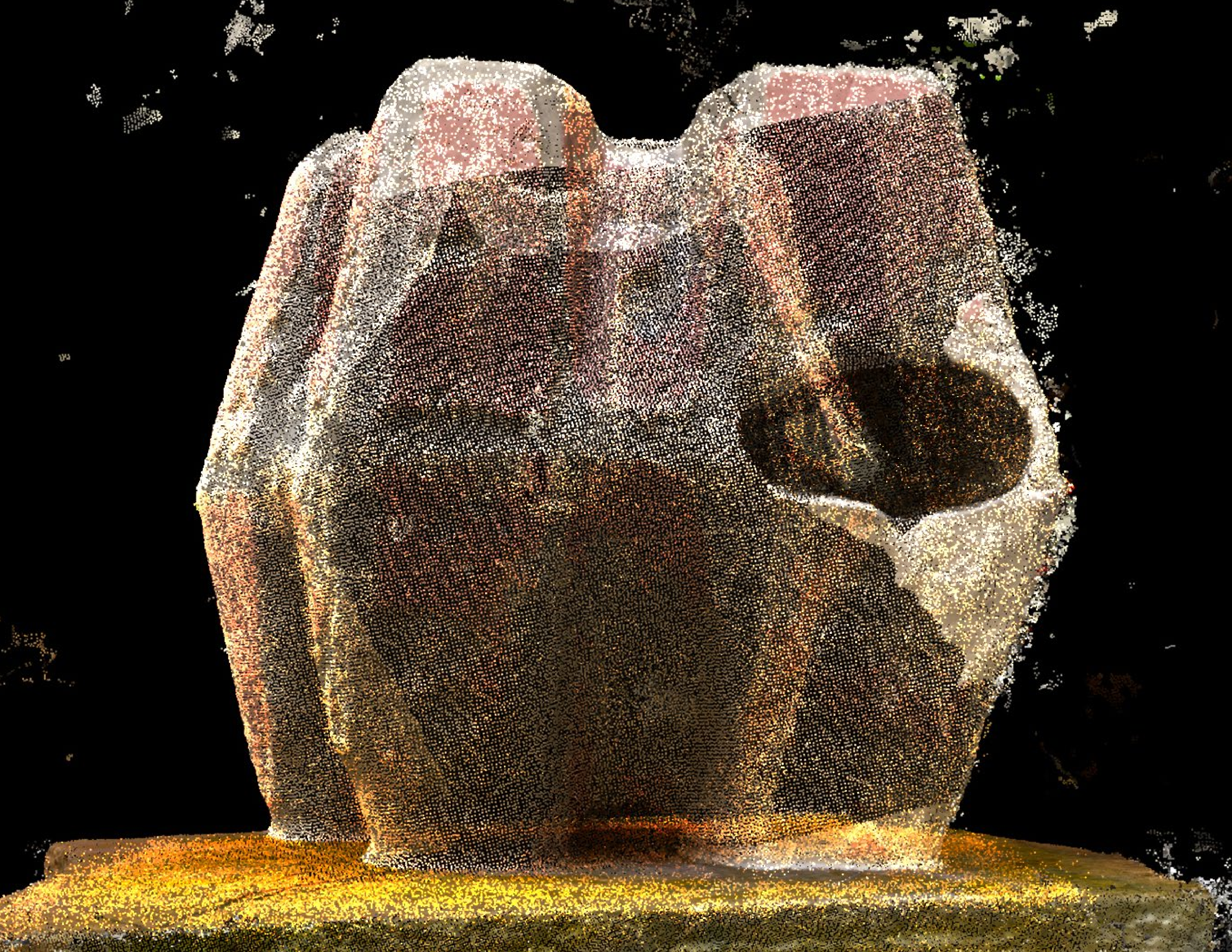


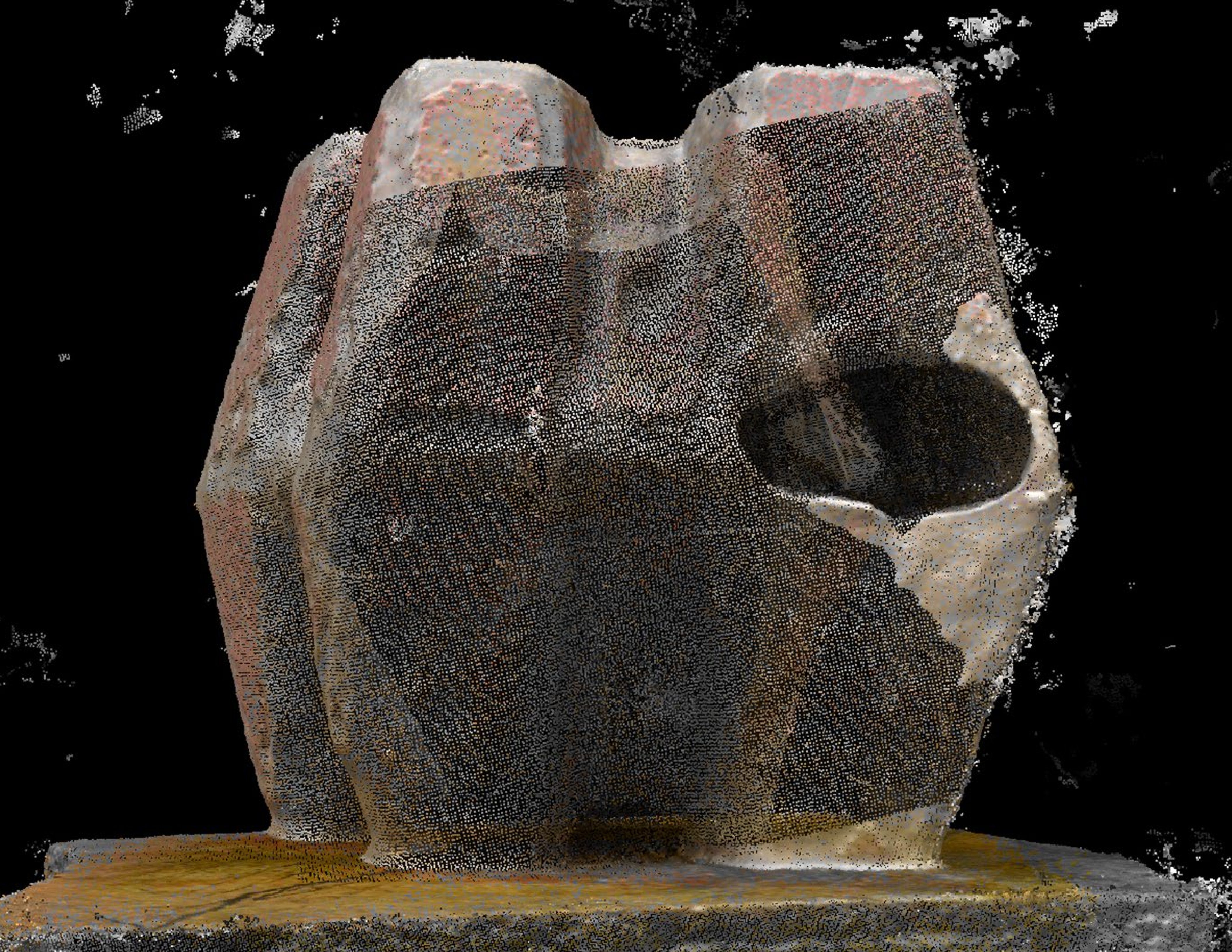






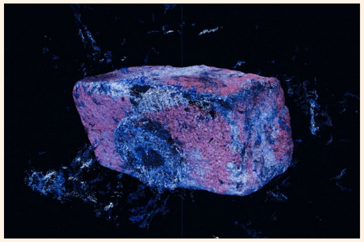






8.9 Block undergoing rain exposure

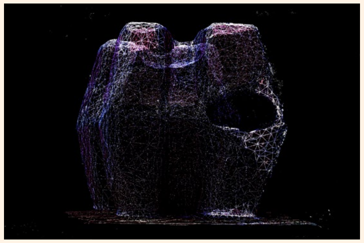
8.10 Photogrammetry result of test block after water exposure



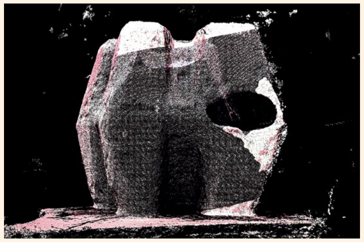
8.11 3D scan of test block in MudBox

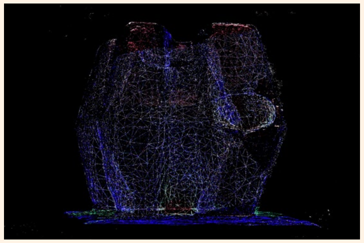
8.12 3D scan of test block in MudBox

8.13 3D scan of rain-exposed block: mesh overlay

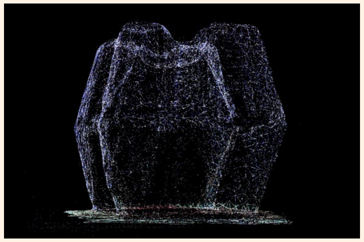


8.14 3D scan of rain-exposed block: mesh surface

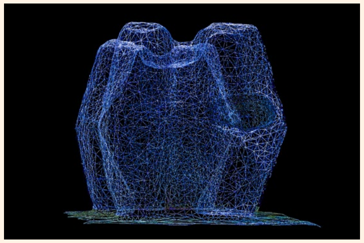




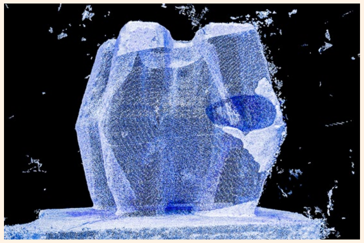
8.15 3D scan of rain-exposed block: mesh lattice



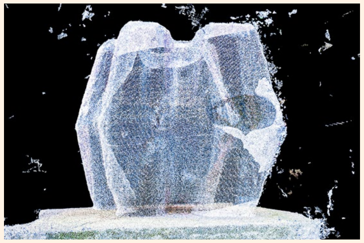
8.16 3D scan of rain-exposed block: point cloud



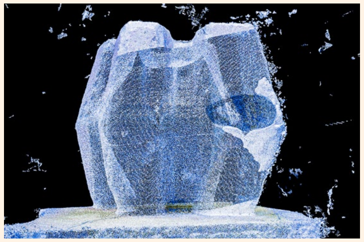
8.17 3D scan of rain-exposed block: mesh overlay



8.18 3D scan of rain-exposed block: mesh overlay



8.19 3D scan of rain-exposed block: mesh overlay



8.20 3D scan of rain-exposed block: mesh overlay

Exhibition

From May 14th to May 23rd 2021, the completed artefacts and the tools used in their production were exhibited to the public in Downtown Syracuse at 337 South Salina Street. The exhibit temporarily occupied a vacant storefront, previously used by a children's clothing store. The objects were arranged in dialogue with six other projects in the *Dissimulating and Disheveling Matter* thesis advisory group.

The *Terra Dispositions* exhibit consisted of two double height shelving units holding cottled molds, fired blocks and the test objects molds. Between them, a longer, shorter shelf displayed a spread of the tools and materials used in the production of the blocks. Four explanatory posters were affixed to the adjacent wall. The centerpiece of the exhibit was a five foot tall display rack constructed out of MDF. The rack held 49 blocks in total, in a manner similar to its deployment outside.

The rack served as a post-deployment "archive" of the artefacts, displaying a snap-shot of the blocks after their erosion. Half of the blocks displayed on the rack were fired, while the other half remained unfired.

9.1 Exhibition poster displayed in window


Terra
REGISTRATION
INTERVENTION
ALTERATION

9.3 Elevation of display rack

9.4 Detail of display rack

9.5 View of process table

9.6 View of process table

9.8 Posters flanking the display rack

9.9 View of display rack

9.10 Bottom shelf of process table holding plaster molds

9.11 Exhibition space street view

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Stan Allen, Territory: From the Biological to the Geological

Tanvi Jain, Stepwells of Ahmedabad: water-harvesting in semi-arid India (The Architectural Review, 2021).

Image Credits

INTRODUCTION

1.1 Tanvi Jain and Chandani Patel, "Stepwells of Ahmedabad: water-harvesting in semi-arid India," The Architectural Review, 2021.

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1.3 Antiqua Print Gallery/Alamy, "Wet narratives: architecture must recognize that the future is fluid," The Architectural Review, 2017

1.4 Alamy/Hitesh Sonar, "Water Is Now a Traded Commodity; Can It Still Be a Human Right, Too?," The Swaddle, 2020.

1.5 "What role should the L.A. River play in a future Los Angeles?," Los Angeles Times, 2018.

1.6 Swetha Kannan, Mapzen, OpenStreetMap, LADWP, "What role should the L.A. River play in a future Los Angeles?," Los Angeles Times, 2018.

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1.8 James Corner, "Taking Measure Across the American Landscape." Yale University Press, New Haven, 1995, 90.

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1.14 Perry Kulper, "Drawing Architecture - Conversation with Perry Kulper," Archinet, 2012.

1.15 Anderson Anderson Architects, "Alluvial Sponge Comb," 2006.

THESIS PREPARATION

2.1 Alec Rovensky, original photo, 2020

2.2 Alec Rovensky, original photo, 2020

2.3 Alec Rovensky, original photo, 2020

2.4 Alec Rovensky, original photo, 2020

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2.24 Alec Rovensky, original photo, 2020

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2.28 Alec Rovensky, original photo, 2020

2.29 Alec Rovensky, digital drawing, 2020

2.30 Alec Rovensky, digital drawing, 2020

2.31 Alec Rovensky, render, 2020

2.32 Alec Rovensky, digital drawing, 2020

2.33 Alec Rovensky, digital drawing, 2020

2.34 Alec Rovensky, render, 2020

PRECEDENT STUDIES

3.1 Walter De Maria, "The New York Earth Room," Dia: Foundation, 1977.

3.2-3.4 Miguel Guitart, "Caves."

3.5-3.6 Olafur Eliasson, "Life," Foundation Beyeler, 2021.

3.7-3.8 Olafur Eliasson, "Your Waste of Time," Neugerriemschneider, 2006.

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3.34 Karin Lehmann, "Sediment Sampling," Cfile, 2014.

3.35-3.37 Felix Sagar, "Object Hallucinations," Unit 8, The Bartlett, UCL, 2017.

3.38-3.39 Basil Babichev, "The Museum of Ancient Recipes," Unit 8, The Bartlett, UCL, 2018.

DEPLOYMENT

4.1 Alec Rovensky, original photo, 2021

4.2 Noah Fritsch and Daniel Horan, original photo, 2021

4.3 Vasundhra Aggarwal, original photo, 2021

4.4 Alec Rovensky, original photo, 2021

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4.6 Noah Fritsch and Daniel Horan, original photo, 2021

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Image Credits

4.10 Noah Fritsch and Daniel Horan, original photo, 2021

4.11 Alec Rovensky, original photo, 2021

4.12 Noah Fritsch and Daniel Horan, original photo, 2021

4.13 Noah Fritsch and Daniel Horan, original photo, 2021

MOLD-MAKING

5.1 Alec Rovensky, screenshots, 2021

5.2 Alec Rovensky, original photos, 2021

5.3 Alec Rovensky, original photos, 2021

5.4 Alec Rovensky, original photos, 2021

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5.21 Alec Rovensky, original photos, 2021

5.22 Alec Rovensky, original photo, 2021

5.23 Alec Rovensky, 3D scan, 2021

TOOLS & MISHAPS

6.1 Alec Rovensky, original photos, 2021

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6.3 Alec Rovensky, original photo, 2021

6.4 Alec Rovensky, original photo, 2021

ASSEMBLY & DEPLOYMENT

7.1 Alec Rovensky, original photo, 2021

7.2 Alec Rovensky, original photo, 2021

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7.9 Alec Rovensky, photo collage, 2021

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PHYSICAL & DIGITAL DECAY

8.1 Alec Rovensky, original photos, 2021

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EXHIBITION

9.1 Alec Rovensky, original photo, 2021

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9.11 Alec Rovensky, original photo, 2021

9.12 Alec Rovensky, screenshot, 2021

9.12 This thesis was produced in the midst of the COVID-19 global pandemic. Hybrid classes and ever-changing guidelines resulted in scenes like the one above: a "science-fair" style crit taking place in person at Slocum Hall with two advisors present, in parallel to a zoom-based crit with the other two advisors.